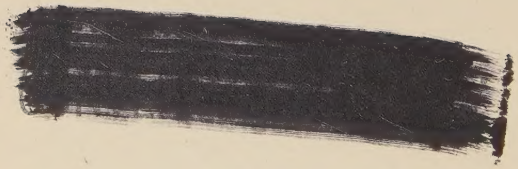
DYNAMIC PSYCHOLOGY

DOM THOMAS VERNER MOORE, PH.D., M.D.



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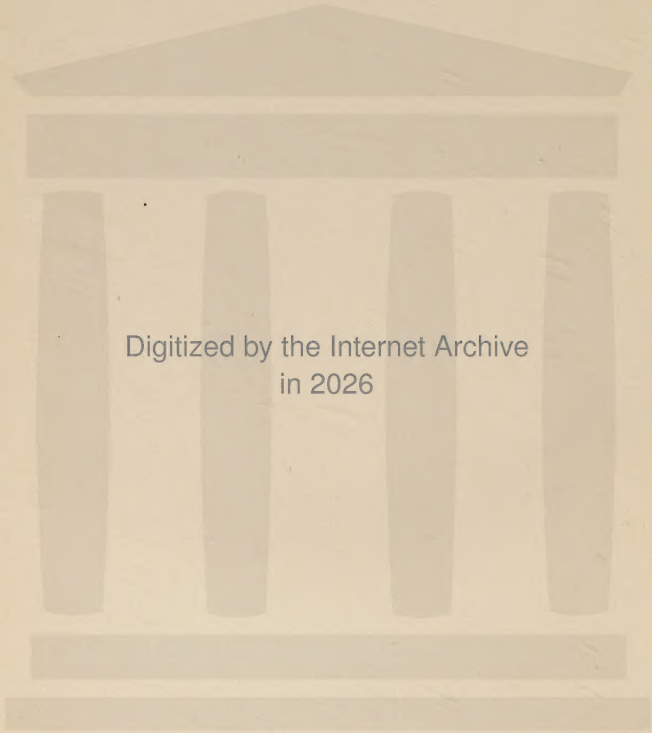
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DYNAMIC PSYCHOLOGY

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DYNAMIC PSYCHOLOGY

AN INTRODUCTION TO MODERN PSYCHOLOGICAL THEORY AND PRACTICE

BY

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PREFACE

THE present work is an attempt to present the essentials of a course in Psychology that will give the student:

(*a*) An insight into the modern trends of Psychology; (*b*) a foundation for a practical understanding of his own inner life that will be of assistance to him in the solution of the mental difficulties that continually arise in the course of an ordinary existence, and (*c*) an introduction to the clinical problems of Psychology that will open the way to an appreciation of borderline mental cases and a technique for handling them, should a medical training lead him further into this field.

While the aim of this work is to give a practical introduction to Psychology, the points of contact between Psychology and Philosophy have not been ignored.

The now broad field of mental tests has not been entered because this has become a special division of Psychology, and a practical treatment of the subject would demand a separate volume.

The work is based upon years of studying and teaching Psychology and the practical experience of handling patients as Director of the Clinic for Mental and Nervous Diseases at the Providence Hospital, Washington, D. C., and during the war as Captain and Major in the Medical Corps of the United States Army in this country and in France. Experimental Psychology and Human Pathology have been drawn upon to clear up certain theoretical points and to present the most important evidence on the theoretical problems discussed.

A glossary of technical terms has been added for the convenience of the general reader.

It is to be hoped that the work will be of real service, not only to those who study Psychology as a part of a liberal education,

but also to spiritual advisors, professional psychologists, social workers, and physicians in their daily work.

Since the name Dynamic Psychology was previously used by Professor Woodworth, of Columbia, as the title of one of his publications, I wrote him before publishing this work, and he graciously welcomed another book bearing the same title as his earlier volume.

The chapter on the Psychotaxes and the Parataxes appeared in the *Psychoanalytic Review* in April, 1921, along with a discussion, omitted in the text, of the concept of the Parataxis as a specific medical diagnosis applicable to certain borderline cases. The Editor, Doctor White, has kindly given permission to make use of the material in this volume. The chapter on the Sensations Involved in Voluntary Movements and that on the Pathology of Voluntary Action were recently published in the *International Clinics* with the understanding that they were about to be published in this volume.

My thanks are due to Monsignor Pace and Doctor Kerby, of the Catholic University, for reading the manuscript, and to my assistants Mr. John W. Rauth, for attending to the illustrations for me during my absence from the country, and Mr. T. G. Foran for reading the proof. I am also indebted to Dom Aidan Baldwin for assistance in the proofreading.

THOMAS VERNER MOORE.

St. Benedict's Abbey,
Fort Augustus, Scotland.
March 21, 1924.

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PART I

THE ANALYSIS OF MIND

DYNAMIC PSYCHOLOGY

CHAPTER I

THE CONCEPT OF PSYCHOLOGY

THERE is no definition of psychology at the present day that meets with the approval of all students of the science. This lack of unity in the modern concept of psychology is due to several factors.

1. The close relation of psychology to philosophy, from which it has budded off as an independent study.

Metaphysical concepts, one might even say prejudices, are more potent factors in the minds of all men, even scientists, than many would be willing to admit. Different metaphysical attitudes really influence the ideas of the psychologists as to the nature of psychology.

2. Modern psychology is a relatively young science and only in its maturity does a science really crystallize its definition.

3. Psychology is a rapidly growing science splitting up into various subforms, begetting a numerous progeny so that it is hard to decide among its various heirs which is the rightful successor to the name.

This being the case, it is fairer to the student to let him know what psychology has been in the past and from the historical facts deduce the concept of what should be regarded as truly expressing the nature of psychology.

We are confronted with a difficulty at the outset. The name, psychology, is a comparatively recent invention. It is by no means as old as the science itself and was utterly unknown when psychological problems were first discussed in the days of the Greek Sophists. The name, therefore, does not necessarily define for us the science. Were we to take the roots of the word psychology which comes to us from the reformer Melanchthon,[1]

[1] Melanchthon, Philip, a German Reformer, 1497–1560, Murray's *New English Dictionary*, p. 314, Vol. VI, 1904.

psychology would mean the science of the soul: λόγος, a root taken, nowadays, to indicate science and ψυχή, soul.

This, however, was not the original concept of psychology. If we go back to the first psychological treatise or group of psychological treatises, we find them in the *De Anima* and *Parva Naturalia* of Aristotle. If we look into Aristotle's treatise, *De Anima*, we shall see that it really is an attempt to analyze the facts of our mental life. If, however, we wished to give a modern name to the various works grouped together as Aristotle's psychology, this name would be biology rather than psychology, for the discipline that they treat of is said to be the science of life in all its manifestations. Life, according to him, is that which is capable of at least nutrition, growth and decay. Besides these fundamental essentials of life, which are found even in plant organisms, there is the fuller life of sensation manifested in animals and of the higher thought processes manifested in man. In the special treatise on "The Soul" Aristotle pays attention mainly to the analysis of sensation and the thought processes of human intellectual life. Bound up with his treatise on the soul were several minor treatises that were termed *Parva Naturalia*. The very titles alone indicate a body of knowledge which extends beyond the metaphysical discussion of the nature of the soul, its freedom, immortality, and other such problems that philosophy now claims as its own.

The titles of the *Parva Naturalia* were as follows:
Concerning Sensation and That Which Is Sensed;
Concerning Memory and Forgetting;
Concerning Sleep and Awakening;
Concerning Dreams;
Concerning the Interpretation of Dreams;
Concerning a Long Life and a Short Life;
Concerning Youth and Old Age;
Concerning Life and Death;
Concerning Respiration.

When we read these titles we see that the first great psychologist made an attempt, very bold for the fourth century

B.C., to delve into what we now term physiological psychology and even into problems which the most modern of psychological disciplines, psychoanalysis, has claimed as its own.

Throughout the Middle Ages several treatises were written which adopted as their title the *De Anima* used first by Aristotle. These treatises, however, were written from the metaphysical point of view.

The name psychology, as we have seen, was used by Melanchthon in the sixteenth century. A hundred years later, Christian Wolff (1679-1754) employed the term rational and empirical psychology. This terminology of Wolff has continued down to the present day with, however, a modification in the meaning of the terms. According to Wolff, there are two methods of studying the soul—the method of reason and the method of experience. Rational psychology investigates the soul by reason; empirical psychology investigates it by experience. From this point of view rational and empirical psychology cover the same field but by a different method. It was soon seen that reason could investigate some problems and empirical research others. It is not possible to study all the problems of psychology by the same method. The distinction, therefore, between rational and empirical psychology became one both of field and of method, rational psychology undertaking to study the metaphysical problems, the nature and origin of the soul, and empirical psychology confining itself to the phenomena of the mind. There was but little progress made in this empirical investigation until physics and physiology had developed methods of study which could be applied to the sensory life of man. When this development was attained, physiologists began to investigate the relation between the stimulus and the sensation which it produces. This was in the first half of the nineteenth century. The original investigators were physiologists.

Empirical psychology, as a real scientific discipline, had its birth in physiology and not in the philosophy of Christian Wolff. A new science was begotten which was first termed psychophysics and later, physiological psychology, and then, experimental psychology, and, occasionally, empirical psychology.

The first work which we may look upon as a treatise *in extenso* of the new science was Gustav Theodor Fechner's *Elements of Psychophysics,* the first volume of which appeared in 1859, the second in 1860. He thus defines psychophysics: " An exact science of the functional relations of dependence between body and mind or, more generally, between the bodily and mental or the physical and psychical world." (P. 8.)

The term " soul " Fechner understood in a very broad sense. In fact, it embraced everything apprehended by inner experience or that could be deduced from inner experience. By the term " body " he understood everything that could be perceived by outer experience, that is, by the senses, or could be inferred from these perceptions.

In 1874 two important works on psychology appeared—one was that of Brentano, *Psychology from the Empirical Standpoint.* He gave a definition of psychology, which became very popular and until recent days was the commonly accepted definition of psychology, namely, psychology is the science of psychic phenomena, that is, of conscious processes. He attempted to show that this definition meant neither more nor less than, psychology is the science of the soul. He adopted this definition because it implied no metaphysical theory whereas the old definition did.

The second great work on empirical psychology which appeared in 1874 was destined to go through six editions and to become the classic work on psychology and has been superseded by no other until the present day. This was Wundt's *Outlines of Physiological Psychology.* In his first edition he thus contrasted physiology and psychology: " Physiology supplies us with information concerning those vital phenomena which may be perceived by the outer sense. In psychology, however, man beholds himself from within and tries to explain the interrelation of those phenomena which introspection presents to his view." [2]

[2] *Grundzüge der physiologischen Psychologie,* Leipzig, 1874, first edition, p. 1.

A number of psychologists adopted the definition of Brentano, so that psychology was usually defined as the science of conscious processes or the science of the facts of the phenomena of self or the science of consciousness.

In the meantime, experimentalists were attempting not only to investigate the mental life of man but also to throw some light upon the much discussed problem of animal intelligence. There is, however, this difficulty about the investigation of animal psychology. One can give the animal no verbal instructions; and when one is through with the experiment, one can ask the animal no questions. It is, therefore, necessary to make use of purely objective methods, that is to say, to put the animal in various situations and watch its behavior. One puts a dog in a box, for example, that can be opened by a latch and watches how it gets out and measures the time it takes to liberate itself in successive trials, and thus investigates the time curve in the animal's process of learning.

This objective method of procedure threw a great deal of light on the problem of animal behavior and even gave some insight into the probable nature of animal intelligence as compared with human nature. Those who made use of the method were so thrilled with their success that they wished to apply the same method to the study of the human mind. This they proceeded to do, and this they had every right to do and might hope to obtain and did obtain a number of very interesting results.

Unfortunately, the human mind has a monistic tendency to extreme simplification, which manifests itself under various disguises. If a principle finds valuable application anywhere, some wish to extend it so as to explain everything, and so animal psychologists were not satisfied with applying objective methods to human psychology but commenced to maintain that no other methods whatever were applicable to the mind of man. One must treat a human being as one would an animal. One must ask the subject in the psychological laboratory no questions at all. One must never demand any introspection. One must confine oneself to the objective method. Thus, Watson defines psychology as " a purely objective branch of natural science." Its theoreti-

cal goal is the prediction and control of behavior. Introspection forms no essential part of its methods, nor is the scientific value of the data dependent upon the readiness with which they lend themselves to interpretation in terms of consciousness.[3]

After the denial of the value of an appeal to consciousness in the study of psychology, extremists went on to maintain that there is no such thing as consciousness. This extreme attitude seems even to have been adopted by James in his later days. "For twenty years past," he says, "I have mistrusted consciousness as an entity; for seven or eight years past I have suggested its non-existence to my students . . . It seems to me that the hour is ripe for it to be openly and universally discarded."[4]

This school which would define psychology as the science of behavior is known as Behaviorism, and its adherents as Behaviorists.

It is difficult for one to understand this denial of consciousness without an insight into Behaviorism as an outgrowth from animal psychology. With this foundation, however, and keeping in mind the natural tendency of some personalities to all embracing monistic concepts and sweeping denials and affirmations, and not forgetting either the delight of the radicals to shock the sensibilities of the conservatives, and the craving of every man to bring forward something new and startling, we may understand the "psychology" of the Behaviorists though we may have serious misgivings as to the solidity of its logical foundations.

The Behaviorist certainly has every right to investigate behavior to the exclusion of consciousness, if he will. When, however, he maintains that psychology is solely the science of external behavior and not an analysis of inner experience, he has no historical foundation for thus limiting the term "psychology." It may be difficult to study our inner mental life, but it is undoubtedly a field of investigation and a field of investigation which has long been termed by the name of psychology. This inner mental life is of interest to many investigators, and they

[3] *Behavior: An Introduction to Comparative Psychology*, by John B. Watson, New York, 1914, p. 1.

[4] Quoted by Frost, *Psychological Review*, 1914, XXI, p. 204.

have every right historically to term this science of our inner mental life psychology. It is impossible to investigate everything in our mental life by objective methods for this inner experience is far richer than its manifestations by actions or reactions that can be the objects of an external observer's experience.

Nor has Behaviorism been able to attain its goal and predict and control human behavior. A pure Behaviorist would have little place in a psychological clinic or the schoolroom or the Juvenile Court, etc. Whenever one wishes to understand any of the real problems of mental conflict, or penetrate into the real causes of the difficulties of life, one has to obtain introspections from the patient in trouble. His reactions alone will not give the insight into his personality that is necessary in order to give him the help he needs. Psychology should enable us to solve the difficulties of the human race as well as to investigate the curve of learning in white rats, dogs, cats or human organisms.

In recent times there has been a return to the older concept of psychology as the science of the soul. This tendency is found in Miss Calkins' definition of psychology as the science of the self. To conceive of psychology as the science of individual beings has certain advantages over the conception of psychology as the science of conscious processes. When we study psychology we really seek an insight into the mind and mental life of the individual. We hope for a science which will enable us to interpret not human behavior in general, but the particular behavior of some individual whom we are trying to influence. We may be interested in psychological theory and in the nature of conscious processes as such, but psychological interest does not terminate with pulling the mind to pieces. No analysis is ever satisfactory as a final result. We wish to try to put things together—to synthesize. We study, therefore, in psychology not isolated states of consciousness alone but the mental mechanisms of behavior which are manifested by individual human beings. Psychology, therefore, in the sense of human psychology, may be defined as *the science of the human personality.* It is not necessary in a definition of this kind to assume any theory of

human personality but only that there are personalities, individual human beings who may be studied from the point of view of their mental life and the mechanisms of their behavior. To say that psychology is the science of the soul assumes at the outset a metaphysical theory. It is better to start on common ground. Psychology is not the science of the brain. It is not physiology, the science of the functions of the organs of the body. It is not biology, the science of life in general, as Aristotle defines it. Psychology is merely the science of human beings developed by an analysis of their mental life by experiments, by observations, by everything that will enable us to obtain insight into the minds of men—how they know, how they think, how they reason, how they feel, how they react in the difficulties of life.

Relation of Psychology to Other Sciences

The question is often raised, is psychology a natural science? Before answering this question we may ask ourselves, in the first place, is psychology a science at all? What, we may ask, is a science? A science is a branch of knowledge which seeks an explanation of a correlated group of phenomena or events. Does psychology seek an explanation of a definite field of factual experience? It most certainly does. The facts of experience which are studied in psychology are the facts of our mental life. The task of psychology is not merely to describe these phenomena but to explain them. In this sense, therefore, psychology is a science.

Now we may ask the further question, is psychology a *natural* science? A natural science may be looked upon as one whose explanations are in terms of nature, that is to say, physical motion. The explanations of a natural science must be given according to this concept in terms of matter and energy. We may say rather in terms of energy than of matter, for in most of the explanations of natural science matter does not enter into the question, but only the amount of energy before and after a given event. Natural sciences, so far as their ultimate explanations are concerned, have to do with the manifestations and transformations of energy. Energy is conceived of as the cause of motion, whether of atoms or of masses. Anything that sets in

motion a part of matter, whether an atom or a planet, is energy. Can mental phenomena be conceived of in terms of the motion of atoms or of masses? If we limit ourselves to such explanations as this, we can hardly get beyond physics. We can measure stimuli, we can correlate stimuli with sensations, and when we have done all this we have scarcely trodden upon the field of psychology at all. Psychological explanations are really on a very different basis from physiological. One might learn all about the energy transformations going on in the human body, measure the quantity of food taken and the amount of work done by a human being, and yet one would not understand the true motives of his behavior. If a man appeared to be paralyzed and one understood that the paralysis was not due to any actual injury to the nervous system but to a state of mind, for example, to a desire to get compensation from a railroad company because of the fact that he was in an accident in which he was not really hurt—if one knew all this about a man one would understand his behavior far better than through any insight given by profound chemical studies which might be made of the balance between the energy taken in his food and the energy manifested in his work. Physiological explanations do not help us to understand purely mental facts. It is not likely that they ever will, nor will the principles of physiology enable us, as a general rule, to modify the behavior of criminals or of a psychoneurotic or of an unruly child, etc. This does not mean that physiology may be dispensed with in the study of human behavior. It merely points out that human behavior is not completely explained or understood by an appeal to principles which are strictly those of natural science. Psychology, therefore, is not in the strict sense of the word a natural science. We shall see as we go on that this does not prevent it from being an experimental science or an empirical science. It has many points of contact with the natural sciences. It relies upon physics for information about the stimuli which are capable of producing sensation. Without a knowledge of physics we could not understand how we see, hear, touch, taste, smell, etc. Physics, however, carries us only so far. It leaves us at the

threshold of the bodily organism in which we live. When a stimulus impinges upon one of our sense organs many things happen in that sense organ before we become conscious of something in the outside world. Physiology has investigated the sense organs, the nerves, the brain through which we receive information about the outside world. As psychologists therefore, we wish to learn as much as possible about the way in which we know. Physiology is a very important aid to psychology. One who would become a psychologist cannot get along without a good knowledge of the principles of physiology.

CHAPTER II

CONSCIOUSNESS

Psychology, as we have defined it, is the science of the human personality. What characterizes the human personality most specifically is its mode of conscious behavior. It is perhaps on this account that some psychologists have chosen as their definition: Psychology is the science of conscious processes.

Though the mind cannot satisfy itself with the study of these isolated processes, nevertheless it is necessary for us to analyze consciousness before we can attempt to obtain that synthetic knowledge which gives us an insight into the workings of any individual mind. It is necessary, furthermore, to have names to designate the phenomena we observe. It is necessary to apply those names in a scientific manner, always univocally designating the same fact of observation. Hence, it is necessary, even in dynamic psychology, to know something about the elements of our mental life.

We shall prelude this analysis of our mental life by asking ourselves, first, what, after all, is consciousness itself? This is particularly useful inasmuch as some psychologists have denied the existence of consciousness. If, therefore, the fundamental fact of our mental life is apparently in doubt, it is necessary for us to point out clearly just what we mean by this fundamental fact.

James has likened consciousness to a flowing stream. The analogy is, after all, an apt one. It suggests the continuity of our waking experience. This waking experience is roughly what we understand by consciousness. Man is said to be conscious or unconscious. What goes on in his mind when he is said to be conscious constitutes his consciousness. In other words, consciousness is a generic term that we use to designate the various forms of experience that we are aware of in our mental life. When, therefore, we say that the human mind is conscious or

possesses consciousness, we do not mean to maintain that there is any generic mental experience over and above the specific forms of which we are aware. To do so would be to lose sight of the meaning of generic terms. Trees exist but there is no tree which is not a special kind of tree, which is neither oak nor maple nor elm nor hickory nor walnut, but only a tree. So, also, consciousness exists, but there is no consciousness apart from the specific forms in which it manifests itself. Thus we are conscious when we think, we see, we hear, we are angry, we are annoyed, we are joyful, we are sad, etc. By consciousness, therefore, we merely mean to designate the manifold experiences of our waking life, and no one can deny that we do have experiences of some sort in our waking life.

James' figure, which compares consciousness to a flowing stream, truly points out the continuity of our mental life. For certainly in our normal waking life the modes of experience vary, but there are no lapses such as occasionally take place when an epileptic has a *petit mal* attack, becomes dazed for a moment and knows nothing of what may transpire during his lapse of consciousness. The normal human being in his waking life knows no such lapses. He may be distracted, his thought may not follow any one direction for a very long time, but consciousness in some form is always present. And though sensations come suddenly, and disappear when they do come, they do not awaken us from a state of unconsciousness but suddenly break our flow of thought, as when the river in its downward course meets a rocky crag and breaks in bubbling streamers on either side. So our waking life is one continuous flow of experiences whose character is much more varied than the water in any stream.

Is consciousness ever interrupted? In sleep it seems that consciousness ceases, but no one can ever remember the exact moment of becoming unconscious even in sleep. Consciousness seems to fade into another type of experience of which we have fragments in our memory when we awaken and recall to mind the fragments of our dreams. It is not clear that dream-life itself is not a continuous, unbroken stream of conscious experi-

ence at a lower level. It is not even *absolutely* certain that consciousness ceases under ether or as the result of shock or accident. Nevertheless, seeing that in these states the individual gives no evidence of conscious life and has no memory of anything having transpired during the state, he would be rash indeed who would maintain as a certainty that consciousness continues in such states as these.

What, we may ask, is the ultimate nature of consciousness? To answer this question one must enter the field of metaphysics. Properly speaking, it is no task of psychology, and one may go on and study a great deal about the facts of consciousness without ever knowing anything at all about their ultimate nature. Thus, though chemistry and physics go back in their origins to disputations about the nature of matter, progress in these sciences came only after men gave up seeking an answer to the ultimate question. And so it can be with psychology. Psychology need not answer the question of the nature of consciousness before it investigates the operations of the mind. Nevertheless, it may be pardonable to raise the question and suggest a philosophic answer.

Consciousness, though continuous as a stream of awareness or waking experience, is always in any single one of its actual manifestations a transitory phenomenon. When we look at these phenomena individually, consciousness does not resemble a stream but rather the fireflies that flash in the night. An experience comes and an experience goes. What are these phenomena which arise more or less suddenly and abruptly and then disappear as quickly or fade gradually into oblivion?

All things in nature may be classified as substances or as accidents. Substances have independent existence, such as coal, iron, earth, air, water, trees, animals, etc. Accidents never exist apart from substances. They may be looked upon as characteristics of a substance. Shape, for instance, cannot exist independently and apart from some object whose form it outlines. Color cannot exist without something colored. Motion or action of any kind cannot exist without something that moves or acts. And so consciousness appears to us not as a substance but as an accident, an action of some kind. It is, therefore, the activity of some-

thing. We know it only in ourselves and we are living organisms. We assume that it exists in organisms that are similar to our own. We find that in some manner it is connected with organisms possessing nervous systems. For organisms without a nervous system, such as plants, do not in general manifest those actions which resemble our behavior in our conscious waking life.

Consciousness, therefore, is in some manner the activity of a living organism of a definite type, not of any organism. It is not likely that it would be a mere chemical reaction, for as we understand chemical reactions we do not see any identity between the shifting of atomic groupings and those experiences which we recognize as conscious. At least, in the ultimate analysis, there is no possibility of identifying consciousness with ordinary movement governed by the relations of mass and velocity. And yet we see from the study of physics and of anatomy and of physiology that all our sensations in becoming conscious involve mechanical motion and chemical change. Consciousness, more than anything else, seems to demand in every organism something more than chemical activity.

The German biologist, Driesch,[1] feels that the phenomena of growth and regeneration cannot be explained without the assumption of a vital principle or entelechy in the organism. If this is so, the explanation of a conscious organism by mere physics and chemistry is much more difficult and would therefore demand the assumption of an entelechy as the basis of its conscious life. Metaphysically, one should at least consider the possibility that consciousness is not a chemical reaction, nor is it a secretion of any gland; it is not a substance; it is not physical motion to which all forms of energy are ultimately reduced. It is an activity of the vital principle of an organism. This activity is intimately associated, but not to be identified, with chemical processes that take place in the sense organs, the nerves and the central nervous system. When, therefore, we study consciousness, we must not forget that it has an organic counterpart, nor is it lawful to confound the organic counterpart with consciousness itself.

[1] Cf. *infra*, p. 405 ff.

CHAPTER III

THE UNCONSCIOUS

In 1868, the German philosopher, von Hartmann, published his work, *Philosophy of the Unconscious.* He was not the originator of the concept of the unconscious, but he made it popular because he conceived of it in a fashion that was likely to appeal to the general public. Von Hartmann thought that we had two personalities, one our conscious personality, and the other a secondary personality hidden down beneath the surface of our ordinary consciousness. It was nevertheless exactly the same, in its structure or in its make-up and its mode of action, as the conscious personality of our waking life. He even suggested that the conscious personality functioned through the cortex of the brain, the unconscious personality through the spinal cord and subcortical ganglia.[1] Such an idea as this naturally aroused popular notice.

Janet in his *L'Automatisme Psychologique* attempted to show that a number of pathological conditions of the mind may be explained by supposing that certain elements of our mental life are split off and separated from the control of the conscious personality. These split-off elements then act independently and produce phenomena and actions which apparently do not depend upon the conscious personality.

Since the days of von Hartmann and Janet the concept of the unconscious has been much discussed. It is certainly very important to know whether or not our mental life is split, so that, besides the flow of conscious thought, there is another stream governing our activity of which we are absolutely unaware. Certainly any such idea as this has a bearing on human conduct, and if we are going to understand the human personality, we must know in what sense and to what extent it is true that we have an unconscious mind.

[1] *Op. cit.*, A, 1, pp. 51-61, sixth edition.

In order to answer this problem we shall attempt to outline the sphere of the unconscious by attempting to find various senses in which the unconscious in some form or another or by some extension of the meaning of the word must be admitted.

Acts of consciousness, as we have seen, are activities of something. Spiritualists maintain that they are the activities of a spiritual substance. Materialists maintain that they are the activities of the brain itself. No matter whether the spiritualists or the materialists are right, one thing is clear, and that is, that neither the soul nor the brain is given as a conscious fact. In other words, the organ of consciousness is not conscious immediately and directly of itself. No man perceives his own mind. The brain is unknown to those absolutely ignorant of anatomy. The soul is a conclusion arrived at by argument, not an object of perception.[2]

In the second place, not only is the organ of consciousness unconscious but the operations of the organ of consciousness, whether physiological or psychological, are themselves unconscious.[3] We are not aware of any of the processes that take place in our central nervous system as such. Neurochemistry is not psychology. All neurological processes as such are therefore unconscious. What is true of the physiological functioning of the mind is true also of its psychical functioning. The mind has various functions that it makes use of in its operations. Thus, association and memory are mental functions, but we are never conscious of association as a function, or memory as a function, but only of their end-results. One idea may bring up another idea. The second idea is often spoken of as *an* association. This second idea is conscious, but of the process of association, by which the first called up the second, we are not aware. By memory, which is very akin to association, we are able to live over again our past experiences. When these past experiences revive as *memories*, they are conscious, but the "function of memory," by means of which the past is recalled, of that we have no awareness whatsoever.

[2] Cf. hereon, St. Thomas, *Summa Theologica*, I. Q. lxxxvii, Art. 1.

[3] Cf. St. Thomas, *Summa Theologica*, I. Q. lxxxvii, Art. 3.

Our mental habits, whether in their ultimate nature they are psychical dispositions or neurological traces, are absolutely outside the field of consciousness.[4] They may influence conscious life, but their nature, their character, or anything whatsoever about them, is not given to us among the immediate data of consciousness.

Let us now introduce the term "subconscious." There are some things that are neither strictly conscious, nor strictly unconscious, but occupy an intermediate position. Thus consciousness has a field which has been compared to the field of vision. In the field of vision there is a certain small region which is referred to as the focus point. It is a very limited area that may be seen clearly without any movement of the eyes. Outside of this limited field, everything is more or less blurred. This region, in contrast to the focus point, is termed the field of vision.

Precisely the same thing takes place in our conscious life. We are keenly aware of some one or two things to which we pay strict attention. We are very dimly aware of everything else in the stream of consciousness. Of some of these things we are so dimly aware, when our attention is not called to them, that it would almost seem that they are not conscious at all. If a clock strikes while we are working, and someone shortly afterwards asks us if the clock has struck, we may perhaps be able to answer, but the interval is very short in which that experience fades entirely from the mind. Many things are present continually in the mind, and when our attention is called to them, we are aware of them, but can scarcely be said to be conscious of them when our attention is not directed to them, *e.g.*, the pressure of clothes on the body, the temperature of the body, are usually not objects of experience; the tension of the skin in the various positions of the members of the body seldom becomes conscious unless it becomes painful as in illness; the overtones of a note on the piano may be picked out once our attention has been called to them. In a certain sense we were conscious of them before, but as individual experiences we certainly were not aware of them. All of these things may be termed subconscious. In fact,

[4] Cf. St. Thomas, *Summa Theologica*, I. Q. lxxxvii, Art. 2.

everything which we may recognize as belonging in any manner to the field of consciousness which can be brought to the focus point of consciousness at any time, may be said to be subconscious. Naturally, there are many degrees of the subconscious. The intensity of consciousness, however, fades very rapidly from the focus point to the contiguous regions of the field.

So far, however, we have not come to the crucial problem. There are many states of mind, forms of consciousness, that flit about in the outskirts of our mind and no one doubts the subconscious. But are there any mental states that are not even in the field of consciousness? Are there, in other words, two fields of consciousness that have no connection with one another, but exist on different planes, one above, the other below?

Bleuler,[5] among other lines of evidence for unconscious mental states, speaks of the sensations of reflex action in balancing. Thus, when we walk, stimuli come from the soles of our feet, from the skin, muscles and tendons and enable us to step out with ease and maintain the erect posture. But we are not aware of any sensations exercising a control over the mechanism of walking.

It may be possible that sensations, real mental phenomena, are involved in the control of such movements as walking or in standing, sitting, etc., or in the performance of many habitual acts as washing, dressing, playing a musical instrument, etc. But while this is possible, it is also possible and even more probable, that this control may come from mere stimuli that remain neurological phenomena throughout, and never rise to the conscious level, never become even unconscious mental processes.

Clear evidence of the existence of unconscious mental states must, therefore, be sought in other fields.

Bleuler also points out the evidence that may be adduced from the study of hysterical anæsthesia.

Many patients have areas over their body of greater or less extent that are absolutely insensitive. They are said to be anæsthetic. In these regions you may cut or burn without any manifestation that the patient is aware of any kind of sensation

[5] "Das Unbewusste," *Journal für Psychol. und Neurol.*, XX, Ergänzungsheft, 2, pp. 89-90.

whatsoever. These areas do not correspond to the distribution of the sensory nerves nor to the root region in the cord, nor to the projection diagram of the cerebral cortex. They are not really cut off from the central nervous system.

Binet has made some interesting experiments in which he shows that such areas are still capable of responding to stimuli. Thus, if a patient has an anæsthetic arm and you screen it from him, it is possible to get into communication with the arm while the patient apparently knows nothing of what is going on. The arm supposed to be devoid of all feeling will tap a finger just as many times as the anæsthetic skin is touched; it may even execute automatic writing, expressing opinions about the experimenter, etc., and still apparently the owner of the arm knows nothing of what is going on.

I have never tried these experiments myself, nor seen them demonstrated by others. If, however, the facts are as Binet presents them, they could be conveniently explained by the existence of unconscious mental states in the mind of the subject controlling the behavior of the arm.

Bleuler also speaks of the motives of action in conduct and maintains that conduct is often inexplicable unless one supposes over and above the reasons alleged for behavior other reasons of which the person is not aware.

We have only to recall the men in the parable, who all at once commenced to make excuses, to realize that alleged reasons are often insufficient to explain conduct. If we study conduct and the alleged reasons by which it is explained, we shall have no difficulty in assuring ourselves that the alleged reasons are often insufficient. I think, also, that it will frequently be found that those who give the reasons are often perfectly sincere and truly convinced that their actions are adequately explained by the motives they advance.

Granted then this is so, it would not, without any shadow of doubt, prove anything more than that people are often unconscious of the relation of certain ideas to their conduct.

Thus, in cases of excuse the conduct is not to be explained by the reasons given. But are there not reasons flitting about in

the *subconscious* mind, or *conscious* mind, of the subject that are fully adequate to account for his behavior? What is unconscious may be, not the real motives, but the relation of these real motives to conduct.

Thus, in the war, some soldiers developed what was termed an anxiety neurosis. They fell into an unreasonable anxiety that incapacitated them for duty. I studied several such patients in France who attributed their anxiety to the fear that some of their relatives were dead at home. They said that this must be the case, otherwise they would have had letters from them. There was always, however, a good reason why letters should not have been received. The postal service was abominable, necessarily perhaps, and whether good or bad they had been out of contact with it by reason of their position at the front. The real reason for their anxiety and its teleological incapacitation was not that they were afraid of a death at home, but of their own death on the muddy fields of sunny France.

But were these men *unconscious of their fear?* By no means. But I do believe, from my personal examination, that some of them did not consciously connect their conduct with its real motive—the fear of death.[6]

This leads us on to the consideration of what is termed the complex, an emotionally toned experience, that is looked upon as having been forgotten but, nevertheless, by its associations affecting behavior.

White, in his *Mental Mechanisms,* explains it by the following simile: Suppose a child has a boil on its arm. A physician is called and enters the room with his little black bag. He asks to see the arm which the child innocently and unsuspectingly shrugs up for his inspection. The physician opens the black bag, removes a knife and with a quick movement plunges it into the boil and evacuates its contents. The next day when the physician calls with his black bag he cannot get near the child without it crying and screaming. Some time later, let us suppose, a visitor comes with a black bag. The child sees the bag and immediately commences to make an outcry. His mother hushes his crying and

[6] Cf. *infra,* p. 203 ff.

assures him that the caller is not a bad doctor with a knife. But for some time afterward the child has a horror of black bags. Perhaps later on, having forgotten the incident, he has a peculiar, inexplicable antipathy to people with black bags, or that wear black, or perhaps even to black things in general. When he sees black things, he does not recall the incident in which the boil was lanced with a knife taken from a black bag. That incident is a complex which is forgotten and has sunken into the depths of the unconscious. It is unconscious itself, and its relation to the child's subsequent behavior when a man, is also unconscious.

According to theory, therefore, the complex is an emotionally toned incident which is or may be forgotten, but which, nevertheless, is awakened to activity, producing its original emotional resonance, without the subject having the slightest inkling of the true cause of his unreasonable behavior.

Many cases are given by psychoanalysts of incidents, forgotten beyond the power of recall, but unearthed by them from the depths of the unconscious. These forgotten incidents function in the way just described as characteristic of the complex. I would not call in question the existence of really unconscious incidents that function as complexes, that is, incidents that before analysis had been forgotten by the patient beyond the possibility of recall. I have, however, never found such wholly unconscious complexes in any of my patients; but I have frequently found incidents of one kind or another that analysis showed were connected with the patient's behavior and yet the patient prior to analysis had no idea of the association that had been welded between these past events and his subsequent conduct.

According to the Freudian concept mere analysis suffices for clearing up mental difficulties. The cure is likened to the opening of a boil. A complex is a mental boil and when opened up and discharged, the psyche heals. In my experience, analysis alone seldom effects a cure. The analysis of a pathological association, however, is a real aid.

Its mechanism may be conceived of in this way. Suppose a man whom you ingenuously credited with good intentions had been giving you advice and profoundly influencing your conduct.

Suppose that some day you should discover that he was not considering your interests, but his own; not attempting to help you, but to use you for his own ends. The next time he offered advice it would be robbed of its former potency, because you had an insight into its true meaning. So, also, when by analysis one understands the relation between conduct and complex, he seems to say to himself: And so that is all I am worrying about—that is the reason for my attraction or my fear; and what influenced him so profoundly before is robbed of its potency.

The following case illustrates this mechanism. A young lady came to the clinic; among other difficulties she had an unreasonable attraction for a man very much older than herself. He had never spoken to her about marriage and perhaps would have been surprised had he known the extent of her affection for him. This affection kept her from becoming interested in anyone else; but to marry such an old man would probably have ended unhappily. Merely taking the history of her life revealed that from childhood she had absolutely worshipped her father, and had a tremendous respect for anything he said in spite of his having been several times in an asylum. When eleven years of age she saw her mother, one day, with a gash in the side of her cheek. Her mother told her that she had been hit by something on a train; but she soon learned that her father had attacked her with a knife. Someone said her father was insane. The word shocked her and she has avoided it ever since. That night she was sent to a circus and when she returned she learned that her father was gone. She was dreadfully depressed, lonely and hopeless. But she kept her difficulties to herself. Her father returned home again several times but had repeatedly to be taken away. After one of these removals she met the elderly gentleman, a lawyer who took care of her father's financial affairs. She felt that she was in love with him from that time on, but saw no hope of marriage and no other prospect for herself in the future.

Explanation of the mechanism of pathological association and the probable substitution of the lawyer for her father dissipated the peculiar charm that the lawyer held over her, and gave her once more her freedom.

From this discussion of the complex we may conclude that the influence of ideas and memories on the mental life of individuals may be real and extensive and yet the relation of cause and effect between the ideas and memories and their resonance in the mental life, may be utterly unknown to the subject.

We have two classes of memories:

a. Memories subject to recall with little or no difficulty.
b. Memories beyond the power of recall or subject to recall only in response to special methods of analysis.

Can memories of the latter sort, truly unconscious memories, produce the same effects as the former? The literature says yes, and there is no good reason for calling the verdict in question. Whether either type of memory produces its effects as mental or physical traces in the substrate of our mental life or by being aroused to the condition of unconscious mental states, cannot be decided. But until it is proven that these memories produce their effects not as traces but truly as mental states, they cannot be adduced as evidence of "unconscious conscious processes," and what we seek now is evidence of these "unconscious conscious processes." The apparent contradiction need not be cause for concern. The conscious processes of one man are unconscious to another, for they are unconnected one with another. The conscious processes in the twilight state of epilepsy are not known by those of the normal states, because they are unconnected. This lack of connection may make possible two simultaneous streams of consciousness, just as there might be branches of a river wholly unconnected on either side of a long island between them.

Are there any such islands in the stream of consciousness?

The most direct evidence is that produced by Morton Prince in an experiment on post-hypnotic suggestion.[7]

"While the subject was in hypnosis the problem was given to add 458 and 367, the calculation to be done *subconsciously* after she was awake. The problem was successfully accomplished in the usual way. The mode in which the calculation was effected was then investigated with the following result: In what may

[7] *The Unconscious*, second edition, 1921, pp. 169–171.

be termed for convenience, the secondary consciousness, *i.e.*, the subconsciousness, the numbers 458 and 367 appear as distinct visualizations. These numbers were placed one over the other, ' with a line underneath them, such as one makes in adding. The visualization kept coming and going, sometimes the line was crooked and sometimes it was straight; the secondary consciousness did not do the sum at once, but by piecemeal. It took a long time before it was completed.' The sum was not apparently done as soon as one would do it when awake by volitional calculation, but rather, the figures *added themselves* in a curious sort of way, the numbers were visualized and the visualization kept coming and going and the columns at different times added themselves, as it seemed, the result appearing at the bottom.

"In another problem (453 to be multiplied by 6), the process was described as follows: The numbers were visualized in a line, thus 453 x 6. Then the 6 arranged itself under the 453. The numbers kept coming and going the same as before. Sometimes, however, they added themselves and sometimes the 6 substracted itself from the larger number. Finally, however, the result was obtained. As in the first problem, the numbers kept coming and going in the secondary consciousness until the problem was solved and then they ceased to appear. It is to be understood, of course, that the *normal or personal consciousness was not aware of these coconscious figures, or even that any calculation was being or to be performed.*"

Taken at its face value, this experiment would demonstrate the existence of these unconscious conscious processes. The example quoted is but one of many experiments in which these unconscious processes, or, as Prince terms them, coconscious ideas were described. Prince writes of the experiment as follows:

" The description of these ideas has been very precise and has carried a conviction, I believe, to all those who have had an opportunity to be present at these observations that these recollections were true memories and not fabrications." [8]

But hypnotic subjects are very much inclined to give the hypnotizer any answer they may guess that he expects, and are

[8] *Op. cit.*, pp. 168-169.

inclined not so much to pure fabrication but to what might be termed the delusion of suggestion. Such suspicions cannot help but throw a cloud on the evidence; but with all that, Morton Prince's experiment is very suggestive and inclines one strongly to the conclusion that coconscious processes are real elements in our mental life.

But, you may say, what happens to human responsibility if the mind is subject to unconscious drives?

Take for instance, such cases as those reported by Healy. A boy, having learned bad sexual practices and stealing from one and the same companion, developed a peculiar, periodic, apparently unmotivated drive to steal. What has happened is that the patient has developed a pathological association between stealing and sexuality with which its learning had been combined. Thereafter, stealing had a sexual charm that usually and normally does not belong to it at all. The patient does not know the source of its peculiar attractiveness. Healy has cured such cases by analysis. With insight into the origin of the charm the association was broken up.[9]

It is not necessary for us to know why a course of action appeals to us in order to resist it. The sexual drive is strong, but not irresistible. The fact that it masks itself under the temptation to steal does not make it overpowering. The unconscious by shuffling the cards makes peculiar and uncanny problems but not insoluble ones. We are all subject to pathological associations. No one can render an account of all his likes and dislikes. But it is not necessary in order to behave ourselves with decency and discretion. Something may appeal with a peculiar, indescribable and inexplicable charm. Analysis of the charm is not necessary in order to see whether or not the course of action it leads to is or is not in accord with the ideals of conduct. The ability to compare action with the standards of conduct is the root of freedom. If we would escape the drive of the unconscious we must regulate our conduct according to principle. If, how-

[9] Cf. Wm. Healy, *Mental Conflicts and Misconduct*, Boston, 1917, p. 183 ff.

ever, we follow whims and fancies and thoughtlessly yield to desires the unconscious bears us along and we know not whither we are going.

From the above discussion it is clearly evident that there are conscious mental processes and subconscious mental processes. It is very likely also that there are unconscious mental processes. May we also say that besides the unconscious mental processes there is also a subconscious personality?

To answer this question we must distinguish between two senses of the word personality; (a) the metaphysical sense and (b) the empirical sense.

The metaphysical personality is the ultimate substrate of our mental life. Materialists would say that this ultimate substrate is the brain. On this theory it is clear that there is in any one man only one central nervous system. Though it is conceivable that the conscious might be connected with one part of the nervous system, and the unconscious with another and though some authors have pointed to the two cerebral hemispheres, and others to the subcortical ganglia as possible explanations of the duality of the mind, nevertheless such suggestions have no foundation in fact and are pure conjectures.

If, however, the ultimate substrate of our mental life is a spiritual psyche or soul, there is no reason to suppose that in any one organism there is more than one "entelechy" or vital principle of its growth and consciousness.

Metaphysically, therefore, there is but one personality.

What, now, do we understand by personality in the empirical sense? It is our concept of ourselves, our memory of our life, into which is set, like jewels in a ring, the mental events of the present. There may be fluctuations in the emotional tone of this complex of mental processes but usually even in emotional life there is a certain unity in its undercurrent.

If for any reason the unity of memory is broken, the empirical personality disappears as a stream sometimes flows underground only to appear again, further on. Normal interruptions of our mental life occur during sleep, but when we awaken the same old self makes itself manifest. In epilepsy one may distinguish

two empirical selves, the normal self and the twilight self. Usually the twilight self has only sporadic minutes of existence. Sometimes, however, these minutes lengthen into days.

Besides these epileptic transformations of personality which are common enough there are alterations of personality in individuals who show no signs of epilepsy whatsoever. I have never had the good fortune to study any of these cases myself. Cases, however, are reported of more or less sudden changes of personality. One personality will be quiet, refined, sedate, the other noisy, vulgar and tom-boyish. One personality knows only by hearsay what the other one does. The memories of one, therefore, are unconscious to the other. In one and the same individual there are two streams of consciousness apparently wholly unconnected. When one is above ground, the other is below. The splitting of the empirical personality may go even further. Three and more personalities in the same individual have been described.

The physiology of such changes is even more undeveloped than their psychology. If we understood the physiological basis of the continuity of memory we would undoubtedly have a better insight into their nature. On the psychological side our own subconscious life and alterations of mood are perhaps the basis of these more marked transformations of personality. But in the midst of all these changes, great or little, there is only one psychic field in which they occur, and that is the one Ego, the one metaphysical personality, the one substrate of our mental life.

CHAPTER IV

DREAMS AND THE UNCONSCIOUS

BEFORE approaching the study of the various methods of analyzing the unconscious it will be useful to understand something about the theory of dreams, for one of the most important methods of analyzing the unconscious is the method of dream interpretation. Sigmund Freud has the credit for giving the psychological world its first true insight into the nature of dreams. We shall therefore commence our study of dreams with an outline and criticism of the Freudian view.

According to Freud, "*some reference to the experiences of the day which has most recently passed is to be found in every dream.*"[1]

He gives various examples in which he has been able to trace the dream to some incident which transpired in the day that had just elapsed. In my own experience with dream analysis this principle seems in general justified. Sometimes, however, the incident which gives rise to the dream is not the day just past but dates two or three days previous to the night of the dream. It is true also, as Freud suggests, that something which is apparently trivial is the starting point in which the dream takes its rise. Thus, a middle aged lady reported to me the following dream as one that had absolutely no meaning. She dreamt that she had been an ostrich feather and had been changed into a feather duster. Analysis revealed that she was really very much worried about the approach of old age. The dream, therefore, has the following interpretation. In her youthful days she was the ostrich feather; now no one pays any attention to her, everyone passes her by and she is neglected. The source of the dream was related, by association, to her noticing the day previous a feather which had fallen from a feather duster on

[1] *The Interpretation of Dreams*, English translation, New York, 1913, p. 139.

the floor, and for some reason or another the thought came to her mind that everybody was walking over this neglected piece of feather duster. In her waking hours she did not see the analogy between the much-trampled feather and herself, but in the night-time her anxiety expressed itself in a dream by a symbolism which had its origin in a trivial incident of the previous day's experience. As we shall see, in the theory of dreams outlined below, dream-life probably takes its start in the thought of the day that has just elapsed. It is not, therefore, surprising that the dream is associated with the incidents of the day before.

Not only is the dream according to Freud related to the day that has just elapsed, but it also goes back to the experiences of early childhood. Thus, he says: " The dream often appears ambiguous, not only may several wish-fulfilments, as the examples show, be united in it, but one meaning or one wish-fulfilment may also conceal another, until at the bottom one comes upon the fulfilment of a wish from the earliest period of childhood; and here too it may be questioned whether ' often ' in this sentence may not more correctly be replaced by 'regularly.' "[2]

He gives the following example: " A physician in the thirties tells me that a yellow lion, about which he can give the most detailed information, has often appeared in his dream-life from the earliest period of his childhood to the present day. This lion, known to him from his dreams, was one day discovered *in natura* as a long forgotten object made of porcelain and on that occasion the young man learned from his mother that this object had been his favorite toy in childhood, a fact which he himself could no longer remember."[3]

In my own experience the word " often " in Freud's statement should not be replaced by " regularly " but rather by " seldom."

According to Freud also, *all dreams have in them something of a sexual element.* Here again it would seem that the tendency to generalize is exaggerated, for it can scarcely be proved that all dreams have in them a sexual element, but only that many

[2] *Op. cit.*, p. 184.
[3] *Op. cit.*, p. 159.

dreams that seem free from it are nevertheless found on analysis to reveal some kind of hidden sexuality.

The third and fourth chapters of Freud's *Interpretation of Dreams* constitute an attempt on his part to demonstrate that *all dreams whatsoever are wish-fulfilments,* and that there is no such thing as a fear or an anxiety expressing itself in our dream-life. He points out that the dreams of children are frequently plain, ungarnished wish-fulfilments. This I think anyone will be able to confirm who pays attention from time to time to the dreams that children recount. Thus, for example, I remember a child at a little inn where I stopped over night on a tramp through the Sierra Nevadas: The child was told that a lion inhabited a big black crevice in the rocks above and that if he would wait up at night he could see him come out in the moonlight and hear him roar. Naturally, the child wished to stay up and hear the lion, but was put to bed. The next morning he came down in great glee rubbing his hands and telling how he dreamt of the big lion coming out of the rock and prancing about and roaring to his heart's content. The child, therefore, was not to be outdone. He was forbidden to stay up and see the lion so he got out of the difficulty by seeing him in a dream.

Naturally, Freud does not maintain that all dreams are plain, ungarnished wish-fulfilments for this would be disproved by nightmares and various frightful experiences in dreams. The dreams of adults, he says, are seldom like the dreams of children because of the distortion that the wish must suffer in order to attain its expression. We must, therefore, distinguish between the manifest and the latent content of dreams. The manifest content is usually a meaningless phantasmagoria in which personalities are disguised. In the disguised personality there is, however, usually something of the nature of the devil's cloven hoof that betrays his character, such as the color of the hair, the presence of a beard, a peculiarity in the clothing, etc. One cannot, according to Freud, argue from the fact that persons in a dream are men or women, that, therefore, they must refer to men or women in reality; for a man may appear as a woman in a dream and *vice versa.* Furthermore, dream personalities are

sometimes the telescoping into one of several individuals in real life. From the fact that one dreams of some frightful and terrifying incident you cannot argue that the dream does not represent a wish-fulfilment. Thus, for instance, a young lady dreamt of her father's death. She had a real affection for her father. How is it possible for a dream of this kind to represent a wish-fulfilment? As a matter of fact, however, her father was an invalid, *absorbed a great deal of her time in caring for him,* and prevented her mingling in social activities for which she had a craving. His death alone could free her, but to consciously think of this would be against the natural principles of a dutiful daughter. Therefore, she repressed into the background of consciousness any wish that might make itself manifest to obtain her freedom by her father's death. The unconscious, however, is no respector of persons or of principles. It wants what it desires without regard to consequences or the ideals imposed by education, or the sanctions of morality. The dream of the girl, therefore, represents an unconscious wish, a desire for freedom. In this way it may be proved that many dreams are wish-fulfilments in spite of their manifest content, but can we, from any amount of analysis, demonstrate that *all* dreams are wish-fulfilments? I might mention cases where patients have dreamt of deaths of individuals in which no reason could be found by analysis why these patients would desire the death of the person of whom they dreamt. The Freudians will answer to any such cases as these that the dream is not adequately analyzed, in fact, Freud disposed of a number of dreams that are apparently exceptions to his theory in the following way: "If I group the ever frequently occurring dreams of this sort, which seem flatly to contradict my theory, in that they contain the denial of a wish or some occurrence decidedly unwished for, under the head of counter wish-dreams, I observe that they may all be referred to two principles, of which one has not yet been mentioned, although it plays a large part in the dreams of human beings. One of the motives inspiring these dreams is the wish that I should appear in the wrong. These dreams regularly occur in the course of my treatment if the patient shows a resistance to me, and

I can count with a large degree of certainty upon causing such a dream after I once explain to the patient my theory that the dream is a wish-fulfilment."[4]

It may be that Freud is right in referring the dreams that seem to be exemplifications of the inadequacy of his theory to a desire on the part of the patient to prove that his theory is wrong. As a matter of fact, patients do attempt to demonstrate the falsity of the theory when once it has been proposed to them or at least they will give a dream which is apparently not a wish-fulfilment and say: "There, this shows that the theory is not correct." Thus a patient once related to me as disproving the wish-fulfilment theory of dreams that she had dreamt that her mother had gone to live with her sister-in-law. "There," she said, " is a perfectly common-place event that has no relation whatsoever to any wish-fulfilment." One of the patient's difficulties, however, was precisely with her mother, inasmuch as her mother had the unfortunate habit of drinking too much, and during these times had caused the patient serious trouble and anxiety. Knowing this I immediately asked the patient if she did not have a grudge against her sister-in-law. She answered with some vehemence: " I hate her." The meaning therefore is apparent. She wishes to burden her sister-in-law with the troubles that she has with her mother.

It would be very difficult by Freudian methods, however, to prove or disprove the Freudian theory. Whether or not all dreams are wish-fulfilments must be determined by the theory of dreams itself. According to Freud *the reason why dreams are symbolic and not plain downright wish-fulfilments is that there exists in our mental life a censor.* Education and environment place upon us many restrictions and, therefore, we cannot do all the things that we would like to do, we become ashamed of those things that society frowns upon. We look on them as unworthy of ourselves, and therefore repress them, banishing them utterly from our mental life. The censor does not allow these things to appear in consciousness in a plain, ungarnished form. Freud says: " The censor behaves analogously to the Russian newspaper censor on the frontier, who allows to fall into the hands

[4] *Op. cit.*, pp. 133-134.

of his protected readers only those foreign journals that have passed under the black pencil."[5]

No explanation has ever been given of the psychological nature of this censor. He is awake both day and night, eternally active with his black pencil.

I determined to obtain some light on the theory of dreams by a study of what I termed hypnotic analogies.[6]

If one dozes off to sleep in day time he frequently passes from a trend of thought of waking life into something which is very much akin to what occurs in our dreams, for example:

"I was reading this morning the epistle of St. Clement to the Corinthians. I looked up the word *παράπτωμα*, finding the sense 'a fall beside,' metaphorically, a transgression. A little later I dozed off and saw a chute such as one sees in a depot where trunks are allowed to slide along a curved inclined plane to the floor below. Numbers of red mattresses, rolled up and tied with a cord, were tumbling down the inclined plane and as they reached the floor below *fell off* at the *sides*. At first I could see nothing with which the peculiar scene could be connected, presently I thought of *παράπτωμα* and the 'fall beside.'

"The railroad seemed to me to be in some way connected with the Union Station at Washington where I came in last night at about eleven. I do not remember any association with red mattresses—except the red bags of feathers used in Germany. I was very sleepy on the car on my way from Baltimore. This might have something to do with an association between the station and the mattress—*via* my desire to go to bed. I, therefore, did not see trunks going down the chute, but mattresses instead."[7]

What happens here is that the thought of the day is continued immediately into the thought of the hypnotic analogy. The hypnotic analogy is not the commencement of a new train of thought but a continuation of the old. The type of thought is essentially different. The thought of the day is logical, the

[5] *Op. cit.*, p. 419.

[6] Psychological Studies from the Catholic University of America, *Psychological Monographs*, 1919, Vol. 27, No. 4, pp. 387–400.

[7] "Hypnotic Analogies," by Thomas V. Moore, *Psychological Monographs*, Vol. 27, No. 4, p. 393.

thought of the hypnotic analogy is poetic and symbolic, but the symbolism is usually too crude to form a part of what waking life would approve of as poetry. In other words, in our waking life we have one type of thought dominant, in our dream-life another. Various authors have called attention to the existence of two types of thought in man. Jung refers to it in his *Wandlungen und Symbole der Libido.* Many authors have recognized this type of thought in the mental life of præcox patients, and here it has been termed " autistic " thinking. What, we may ask, is the reason for the sudden change from logical to symbolic thought in passing from our waking to our sleeping mental life? In our waking life our thought is largely associated with or affected by the activity of perception. In sleeping these sensations are replaced by images. When one is about to fall asleep he is frequently aware of various visual images of the most bizarre character flitting before his mind; at times one may perceive also auditory or other images. Myer has given to these images the name of " hypnagogic hallucinations." They are perhaps to be conceived of as due to the rhythmic activity of the sensory cerebral centres. Though ordinarily this activity does not become conscious when actual sensations are present, we do become aware of it in the quiet that comes with the advent of sleep. Perception in waking life, as may be proved by many examples, is the fusion of incoming sensations with past images and categories of experience. In our sleeping life the sensations are largely lacking. Instead we have a train of thought and the hypnagogic hallucinations. These hypnagogic hallucinations are seized upon by the train of thought, modified by it and woven into the fabric of our dreams. No censor is necessary. Dreams are symbolic because they are woven not from sensations but hypnagogic hallucinations. The trend of thought is not necessarily a drive to wish-fulfilment. Anxieties sometimes find their expression in dreams. More frequently, as dream analysis will show, the trend of thought in dreams tends to flow in the channels of repressed desires, and so these desires mainly find their expression in dream-life. Seeing that repressed desires constitute a large element in our subconscious or unconscious life the analysis of dreams becomes a very important method in the study of the unconscious.

CHAPTER V

METHODS OF INVESTIGATING THE UNCONSCIOUS

When one has had a little experience with mental disorders he will soon become convinced that some abnormal forms of behavior do not have their origin and explanation in the conscious levels of the mind. At all events the development of our knowledge of the unconscious has come to us from those who have devoted themselves to psychiatry, the science of mental disorders.

Those who had to deal with abnormalities of conduct naturally sought further insight into those forms of behavior that seemed inexplicable at the conscious level. They, therefore, developed methods of investigating and analyzing the unconscious depths of the mind.

In the present chapter we shall outline briefly the methods of investigating the unconscious. In mental disorders this frequently means the discovery of some emotionally toned incident in the past, a "complex," which is in some manner related to present behavior.

1. **Dream Analysis.**—The technique of interpreting dreams is very simple. One asks the patient to write out the dream, preferably immediately upon awaking. If a few hours elapse between the time of dreaming and writing out the dream, important elements are likely to be forgotten. With the written copy of the dream before him, the analyzer commences by writing down a phrase. The analyzer then repeats the same to the patient and asks him to tell everything that comes to his mind, jotting these things down as the patient speaks. To be a good dream analyzer one should be a stenographer. The patient is urged to keep nothing back that comes to his mind, to exercise no critique over the order or appearance of his thoughts, but to let his memories and associations flow forth spontaneously. This is done with one phrase after another. In my own experience the first stages of this procedure seem hopeless and it is only when one comes to the

final associations that suddenly the meaning of the dream dawns upon him. No dream can be analyzed without revealing a great deal of the hidden life of the patient. Before attempting to analyze the dreams of others it is necessary, or at least very useful, to analyze a number of your own.

2. **Free Association.**—The method of free association resembles the technique of analyzing a dream. Without any dream the patient is urged to simply proceed to give all memories and associations whatsoever that come to his mind. These are written down and it is supposed that eventually these memories and associations will lead to the revelation of hidden complexes in the patient's life that may be affecting his conduct. Freud ordinarily practised the method by closing the blinds, having the patient recline on a couch while he sat behind the head of the patient taking down in a note-book all the associations and memories that were given. Most psychoanalysts admit that these details are superfluous. The patient may as well sit down in the daylight.

3. **Jung's Method of Controlled Association.**—Jung conceived the idea of measuring the association time of a patient's reaction to a series of words. He prepared a list of 100 words. The patient is given one of these words and asked to say the first thing that comes to his mind. The physician measures with a stop-watch the time that elapses between his pronouncing the word and the patient's response by another word. The whole list is gone through with, the word of response and the reaction time being recorded. When this is over the list is repeated and the patient is asked to give the same association as he gave previously. This in general he will be able to do. Note is now taken of the associations that were exceptionally long, *i.e.*, anything over three seconds, of the forgotten associations, of the associations that seem peculiar and unnatural, of associations which seem to arouse some kind of emotional response in the patient; all such associations are recorded as complex indicators. They call up the complex and are therefore delayed, or another word which does not refer to the complex is chosen by the patient instead, and so reaction time is retarded. The physician then

takes a complex indicator and asks the patient to recall whatever comes to his mind, that is, give a series of associations having their starting point in the complex indicator. This series of associations frequently leads to the complex.

4. Galvanopsychic Reaction.—In this method a series of words is used just as in the last. The indication of the complex is found by means of the galvanopsychic reaction. This is obtained as follows: A beam of light is thrown upon the mirror of a delicate galvanometer and reflected on a transparent scale. When the galvanometer swings, the movement of this beam of light can be observed on the scale. Electrodes from the galvanometer are connected with some part of the patient's body. The galvanometer swings at once, but settles down after a bit to an angle of rest. When a word is spoken it will give a swing, the extent of which may be observed by means of the scale. Some words cause swings that are three or four times more extensive than the others. These are looked upon as complex indicators. I have never used the method, but saw it in operation in the hands of Doctor von Stauffenberg in Munich. A child of thirteen was being observed who came to the hospital with an hysterical paralysis. All words referring to home gave relatively wide swings and it was, therefore, concluded that the child's home relations were unpleasant, which afterward proved to be the case.

5. Method of Partial Hypnosis.—The German psychiatrist, Frank, has advocated [1] the investigation of the unconscious in a kind of semi-hypnotic condition in which conscious attention is not wholly excluded. He produces a mild degree of hypnosis and then asks the patient to recount any images or scenes that he experiences. He finds that patients under these circumstances experience more or less exciting instances of the past and after having lived these instances over again they are free from their anxiety. The following case will explain the method. He gives an account " of a thirty-eight year old man, a motorman on the

[1] " Die Determination physischer und psychischer Symptome im Unterbewusstsein," *Journal für Psychologie und Neurologie*, 1912, XIX, Ergänzungsheft 1, pp. 249-342.

city street car line. The patient complained of strong pressure in the head, flushing, and especially of vertigo. The symptoms were of four years' duration. He slept well, dreamed a great deal but without anxiety. During the day also he did not suffer from anxiety. Physical examination was negative except for exaggerated knee-jerks. A thorough examination of the ear by a specialist revealed no cause for vertigo. The patient was very testy, easily breaking out into anger, forgetting himself in conversation. He complained of headaches which radiated from the occipital to the frontal region. The chief symptom was vertigo, which utterly depressed him. This vertigo always set in when the patient left his street car. As long as his attention was occupied with his work as a motorman he felt absolutely nothing. But on leaving his car the vertigo would last for hours, in fact until he would go to bed. Momentarily he would at times experience a hot flushing in the head which obscured a drumming sensation. The condition developed most insidiously, so at first he attributed the cause to his diet until finally he noticed that neither this nor alcoholic drinks (patient has always been a total abstainer) nor smoking had the slightest influence. On the streets, men and houses would become blurred to him, on the car the phenomena appeared as soon as he no longer had to fix his attention on his work. He attempted, therefore, as much as he could, in spite of the prohibition, to talk with passengers in order to divert his attention. He was therefore glad if anyone came near him so that he could enter into a conversation. Analysis in the semi-hypnotic condition brought out a whole series of frights and states of anxiety which he had formerly experienced, especially when on duty on his car. With the abreaction, the vertigo decreased and after experiencing over again an especially terrifying scene, the patient was free from all pathological phenomena, so that he felt as if born anew."

Frank attributes the reason for the improvement to what he terms the abreaction. He thinks that past emotional experiences for one reason or another were repressed as to their manifestations, producing a state of tension; and when these emotions are

lived through again in a semi-hypnotic condition and allowed to discharge their emotional resonance, this condition of tension is relieved. Whether or not his theory is correct the method is capable of doing the same thing as the Freudian method of free association and may sometimes be used with success when Freud's method calls forth no associations. Some have attempted to investigate the complex by questioning in a condition of deep hypnosis. Such a method, however, is of limited application and does not seem to lead to a satisfactory analysis.

Automatic Writing.—Dr. Anita Mühl has recently developed[2] the technique of automatic writing for the investigation of the unconscious. A pencil is placed in the patient's hand and the arm hung from some fixture above, so that writing movements on the sheet of paper underneath are unobstructed. The patient's attention is then distracted by giving him a book to read. Some patients commence to execute automatic phenomena very readily: Draw pictures, relate fanciful stories, which may be written every alternate line in mirror script, etc. She maintains that the method "may be used as a successful adjunct to psychoanalysis. * * * Once succeeding in getting the patient to 'automat,' the unconscious gives up its material much more readily and for some reasons a patient seems to accept her unconscious problems with much less disbelief when she sees them on paper written by herself, rather than if she merely utters them verbally. The patient may write just simple words, or only nonsense syllables but even so each of these by means of free association will generally go back to conflict material."

Simple as the method is, it must not be regarded as a parlor experiment. Dangerous symptoms developed in one of her patients and the writings had to be discontinued. Automatic writing is for serious use by the competent only.

[2] *Journal of Abnormal Psychology and Sociology*, July-September, 1922; April-June, 1923.

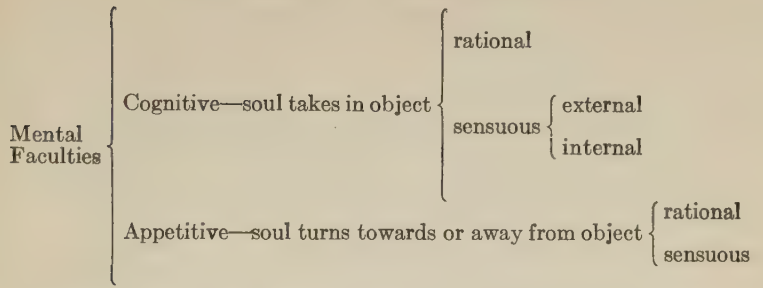
CHAPTER VI

THE CLASSIFICATION OF MENTAL PROCESSES

In comparing our mental life to a stream that is constantly flowing, we have implied that consciousness is continuous and not a group of unconnected states of mind. While this is so, it does not prevent or exclude the possibility of recognizing in our mental life various elements and typical combinations of elements different from and capable of being identified with each other, but which evidently have the one characteristic in common, that they are conscious or in some manner concerned with consciousness.

Origin of Dual Classification.—Fundamental differences in the states of consciousness have been recognized from the earliest days of Greek philosophy, or at least from the time when Anaxagoras (500 B.C.) distinguished the νοῦς from sensory forms of mental content. This distinction between sensory and intellectual forms of presentation was recognized as fundamental from the days of Anaxagoras until the rise of sensationalism in modern philosophy. Besides this distinction there was recognized very early a fundamental difference between the two forms of cognition, sensory or intellectual, and the affective life of the emotions, desires and volitional activity. The philosophy of Socrates clouded this distinction between intellect and will when it did away with the virtue of temperance and maintained that all virtues were forms of prudence. Stoics attempted to explain the affective mental states in terms of our intellectual life. But in scholastic philosophy the two-fold distinction between the sensory and the intellectual, the cognitive and the appetitive, was made the fundamental basis for the classification of the forms of consciousness. So that the following dual classification became the basis of scholastic psychology:

SCHOLASTIC CLASSIFICATION



Origin of Triple Division.—The dual classification was dominant until the eighteenth century. John George Sulzer (1720-1779) in his Berlin lectures in 1751 is said to have departed for the first time from the traditional division of mental faculties into representative and appetitive. At all events, Immanuel Kant made the triple division of psychical functions into ideation, feeling and willing the systematic basis for his philosophy. It is questionable, however, whether this triple division is justifiable, for feeling and willing, as we shall see, seem to be more closely united to each other than to ideation. They may, therefore, be conceived as subdivisions of one group rather than as parallel divisions of the forms of consciousness.

The Fundamental Forms of Mental Activity.—None of these classifications clearly distinguishes the following three forms of mental activities:

1. Mental functions. By this I mean the mechanism by which the forms of awareness are produced.
2. Mental products. By this I mean the resultant of the activity of the mental functions, the forms of awareness themselves.
3. Mental dispositions. By this I mean the trace that is left of the change that is wrought in the psyche as a result of the activity of any of the mental functions.

Let us now consider this tripartite division a little more in detail. It is a tripartite division in a different sense from that of Kant. Kant was classifying mental products. We are here

classifying the fundamental activities of the psyche. The mental products, as we shall see, naturally fall into a binary classification.

Mental Functions.—When consciousness first appears in the mental life of a child, or when, in later life, a state of consciousness suddenly bursts upon the mind, there is always some sort of mechanism, mental or physiological, or both together, which is involved in its production. Thus, whenever we perceive a sensation of any kind whatsoever, there is an activity of the sense organ and a corresponding activity of the psyche, as a result of which we become aware of some sense quality as a light or a tone, an odor, etc. This awareness of sense quality is a sensation. We may clearly distinguish between sensation and *a* sensation that is between sensation as a function and sensation as a product. In the same way we may distinguish between association as a function and association as a product, memory as a function and memory as a product; in fact, for every single one of the forms of awareness, there must be a corresponding mechanism of production. There are, therefore, just as many mechanisms of production as there are products, just as many functions of the mind as there are forms of awareness. It is characteristic of all our mental functions that they are themselves unconscious both in their physiological and their psychological stage, if such a psychological stage is present as something distinct from the end-product, or the state of awareness itself. No one is conscious of what goes on in his eye when he sees, nor in the optic nerve, nor in the brain; no one is conscious of what takes place in the brain or in the psyche when one remembers, or when one attends, etc. We are only aware of the end-result, *a* memory, not the process of memorizing, *a* judgment, *an* insight into the truth of a sequence of propositions that we term reasoning, *an* increase of clearness when something passes from the background of consciousness to the focus point in the act of attention.

Mental Products.—Mental products are the elements of consciousness *par excellence*, the elements that have been classified in most attempts to analyze our states of mind. It is to the mental product that James refers when he likens consciousness to a stream. They constitute, too, those subconscious mental ele-

ments that he spoke of as the fringe of consciousness, and they also constitute the elements of mental life, if any such there are, that make up the fabric of the unconscious. There are no mental products before the operation of the machinery of the mind. What is native to the mind, what is inborn and not made, is the mechanism of the mental functions, the ability to see, to hear, to understand, to read, and to attend, etc. No mental product could be in the mind before the machinery is sufficiently developed to fulfil its normal functions.

Mental Dispositions.—The mind at birth has been likened to a *tabula rasa.* As life proceeds the tablet of the mind commences to be filled with all sorts of writings. Whenever a mental function operates it not only produces a transitory glow like the flashing of a firefly in the night, but it leaves a trace that is more or less permanent on the psyche. These traces, the abiding resultant of the activity of the mental functions, constitute what we may term our mental dispositions. We might term these mental dispositions unconscious mental products to distinguish them from the conscious mental products, the states of awareness that make up the flow of consciousness.

Classification of Mental Functions.—Theoretically, every mental product, as we have said, must have its corresponding mental function by means of which it comes into being. We might, therefore, classify our mental functions, just as we do our mental products. When, however, we come to analyze the mechanism of the mind, we find that while we know a great deal about the mental functions that produce our representative mental states, that is, sensations, ideas, judgments, reason, etc., we know very little about the mental functions that result in the affective elements of our mental life. On this account, in the schema that is to follow we shall make no attempt to include the affective mental functions but simply refer to those functions concerning which we have a considerable amount of information.

There are three classes of mental functions, those that have to do with (1) reception, (2) construction, and (3) conservation. *The functions of reception* are those by means of which knowledge is received into the mind. The chief functions of reception are

attention and perception. Attention is conceived of here as truly a function by means of which a state of consciousness is brought from the background to the focus point of consciousness. According to Titchener, attention is not a function but a definite form of awareness, namely, sensory clearness. In the schema here outlined, attention is a mental function, its product is what Titchener terms clearness. Certainly there must be some mechanism by means of which what is in the background of consciousness is brought to the foreground. This mechanism, whatever it may be, we speak of as attention.

Perception is the other receptive function. It may be defined as that mental function by which we interpret stimuli, or as that mental function by means of which incoming sensations are assimilated to appropriate images and pertinent categories of past experience.

The second group of mental *functions* are those *of construction.* Here we have association, judgment and reason. The attempt of Binet to identify perception, judgment and reasoning and explain them as forms of association can no longer be regarded as tenable since Lindworsky's [1] brilliant analysis of the process of reasoning.

Light may recall by association red, but that is a very different thing from the statement which corresponds to the judgment that the light is red, different because of its objective reference and the actual assent of the mind to the validity of the reference. It is this objective reference and inner assent based upon insight which differentiates judgment from mere association. Two truths may be in the mind some time before one sees the relation between them. Once this relationship is perceived, there may dawn upon the mind the truth of a third principle different from the others, but evidently implicitly contained in them. This insight into the fact that because this truth is so and the second truth is so, therefore, a third must be so, is something different from a mere judgment or the association of one idea with another. It is a perception of dependence, an insight into etiology, which cannot be

[1] *Das schlussfolgernde Denken,* Freiburg, 1916, pp. xvi and 454; *Ergänzungsheft zu den Stimmen der Zeit II Reihe Forschungen,* I, Heft.

identified with the mere objective reference with assent that characterizes judgment.

The third group of mental functions has to do with the *conservation of the data of perception.* This function may be broadly designated as memory. Just as perception is both sensory and intellectual so also memory, which is the conservation of the data of perception, is sensory and intellectual. One may have an image of the dome of the capitol or Washington monument and may remember that both the dome and the monument are white, and that both at times are illuminated at night; one may also recall the steps in the demonstration of a proposition in geometry. The insight into relationships which facilitates the memorizing of geometrical sequences is quite a different thing from the rising before the mind of visual images. It is impossible to learn geometry by heart; it is fairly easy for some to learn it by insight into relations. We have, therefore, both a sensory and an intellectual memory. But, you may ask, why is memory brought in as among the mental functions? How is the mental function of conservation to be distinguished from the traces which are classified under mental dispositions? Memory may be regarded from two points of view. In the first place it may be looked upon as a trace, and if one looks upon it in this way, it belongs to the group of mental dispositions. It may, however, be looked upon from a very different point of view. In order that one may actually recall, the trace must be activated. It must not remain an unconscious affair in the brain or in the psyche but *a* memory must result, *an* image must come before the mind, *a* relationship must be perceived. Conceived of in this way, memory is a function which leads to the product, the individual memory, just as the process of sensation leads to its product, a particular sensation.

Classification of Mental Products.—The foundation of the dual classification of mental products is found in the fact that the mind receives impressions and reacts to the impressions that it receives. The impressions received are the representative or cognitive elements. The reactions to these impressions are the affective or appetitive elements of our mental life. The mental

products of reception may be conceived as actions of the mind in the presence of stimuli. They are representative in character, they picture to us the world outside. These pictures are of two kinds corresponding to the two kinds of perception, *i.e.*, sensory and intellectual. The sensory representative mental states may be subdivided into external and internal. The external are sensations, the internal are our images, the *phantasmata* of scholastic philosophy. The intellectual representations are our abstract ideas, different from the images and sensations themselves. The mind not only receives impressions from without but reacts to these impressions in characteristic ways. These reactions of the mind to the stimuli that it receives are the elements of our affective mental life. It is possible for us to react to impressions in two ways:

(a) We may welcome them, choose them, accept them or reject them, draw our mind away from them or open it to the fulness of perception. These voluntary reactions of the mind are our acts of will.

(b) Not all reactions of the mind are voluntary. Some are necessary. Thus, some things please us whether we will or not. Others displease us without any design on our part. Several forms of necessary reactions may be distinguished. We may mention here reflex action. It is not, strictly speaking, a conscious process. It belongs not to psychology but to physiology. Nevertheless, the school of Behaviorism maintains that conscious phenomena are to be interpreted in terms of reflex action. And so in the schema of the elements of our mental life, reflex action may be mentioned here, as it were, in parentheses. It is nothing more than a mechanically aroused response of a muscle or gland to the stimulus with which it is organically associated, as, for instance, when the pupil of the eye contracts to light. The necessary reactions of our mind are of two kinds:

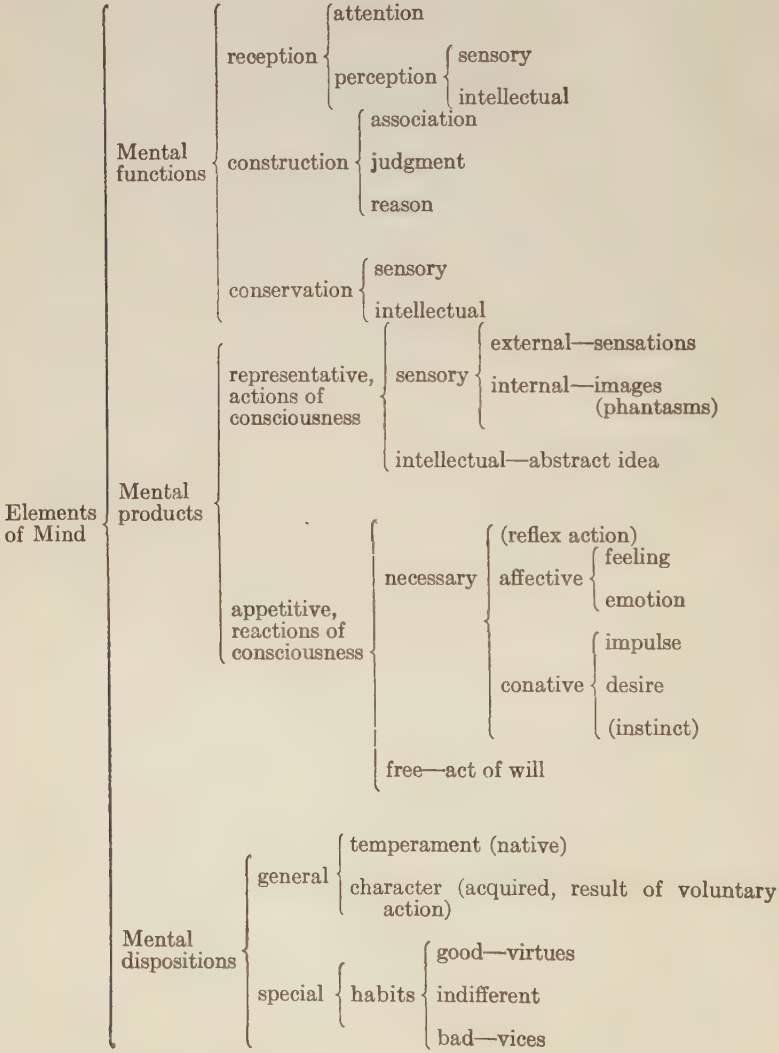
1. The affective reactions in the stricter sense. When a perception arouses our mind to activity, it is frequently pleasant or unpleasant. This peculiar way in which we are affected by the impression so that we like it or dislike it, is termed by psychologists a *feeling*. It is still a mooted point in psychology just

how many elementary feelings there are. It is generally conceded that feelings are elements of our mental life. Whenever an affective reaction of this kind is violent, it embraces much more than mere pleasantness or unpleasantness. It involves deep intellectual insights into the present situation, a tremendous resonance throughout the whole body, all of which is united into one complex, termed *emotion.*

2. The second group of reactions of consciousness may be termed conative. Every mental ability, every function has a native tendency to set itself in action. We have not only eyes but a curiosity to look, not only ears but a craving to hear, not only touch but a tendency to fondle. Thus, every ability that we have creates a tendency within us to exercise it. Whenever we are in the presence of an opportunity of exercising any one of our mental abilities or mental functions, we perceive this native tendency. The awareness of this tendency to exercise one of our abilities or mental functions is what we term an *impulse.* There are just as many impulses as there are abilities. The term *instinct* is nothing more or less than a name in popular usage given to a group of impulses. Thus, the instinct of self-preservation is the name describing the tendency of a human being to make use of all his abilities, whatever they may be, to help him out of danger. By *desire* we may designate the craving that we experience to exercise abilities when an opportunity for doing so is not present. Desires, therefore, may be classified in the same way as impulses and they are measured by the number of human abilities.

Mental Dispositions.—Mental dispositions may be subdivided into general and special. An arbitrary division may be made of the general into temperament and character, a distinction similar to that which Kant made between what he spoke of as the sensory and intellectual character. Thus, he said that at birth an individual is endowed with a group of tendencies and impulses so that the child seeks what he wants without regard to any ideal of conduct or any principle whatsoever. As time goes on, however, the mind comes under the influence of the ideals of conduct that Kant spoke of as the "Categorical Imperative." Then the original native dispositions are modified and made to conform

to an ideal. This distinction put forth in the writings of Kant is not original with this German philosopher, it goes back to St. Paul himself, who complained that " I do not that good which I will; but the evil which I hate, that I do." (Rom. vii: 15.)



We may designate the primitive, unformed native dispositions of a child as temperament. Temperament modified by training and the implantation of ideals of conduct results in something which may be externally very different from its beginning. It is the character of the individual.

Besides these general dispositions of the mind there are special ones, habits, which are formed and facilitate the performance of numerous activities. These habits, from the ethical, but not psychological point of view, may be classified as good, bad or indifferent. Bad habits are vices and good habits are virtues.

Of such elements then is the stream of our mental life composed. In dynamic psychology we consider only one group of these elements, the reactions of consciousness. It is a group, however, that is most necessary to be comprehended in order to understand ourselves and others to develop our lives so that it will be possible to come to a satisfactory solution of the eternally persistent riddle of existence.

PART II

STIMULUS AND RESPONSE AND HUMAN BEHAVIOR

CHAPTER I

REFLEX ACTION

1. Use of the Term "Reflex Action."—The term "reflex action" has been used to designate a variety of responses of living things to stimulation. Thus, when one startles at a loud sound, the muscular contractions of the body that seem to be produced by the noise are reflex in character. When the eye is suddenly illuminated by a bright light and the pupil becomes smaller, the contraction of the iris, which results, is a typical reflex action. When an irritation in the respiratory tract leads to an explosive cough, or a stimulation of the nasal mucous membrane brings forth an expulsive sneeze, the muscular contractions and adjustments that these acts involve are reflex actions. When one walks, or performs some work of skill with his hands, stimuli are continually bombarding the central nervous system from skin, muscles, and tendons reflexly determining finer adjustments of the muscles in action. This interplay of stimulus and response, continuous and ever varying, may be regarded as a series of reflex actions.

The varied movements of unicellular organisms to and away from the stimuli that act upon them have also been termed reflex actions. Thus, when *Euglena viridis* approaches a darkened area and suddenly turns around and passes back into the light, the response of this organism has been regarded by some as a reflex action. Though one may extend the use of terms for good and sufficient reason it would be well in this case to keep before our mind a fundamental difference between a single, smooth muscle cell in the iris and a free swimming, unicellular *Euglena viridis*. The Euglena is an organism complete in itself. The muscle cell is only a part and a very diminutive part of an organism. Both contract, but there may be a profound difference in the source and control of the contraction—a difference which may be so

great as to make it desirable to consider the two phenomena apart and perhaps also to designate them by different names.

The instinctive reactions of animals to the problems of their environment are frequently regarded by students of animal behavior as chains of reflex actions. It is not, however, proved beyond all doubt that stimulus and response in instinctive behavior involves nothing more than obtains in the simple mechanism of the reflex multiplied *n* times by itself. There may be somewhere in the chain of events a certain element of organic control which is not present in the simple reflex arc.

The complex reactions of human beings to the difficulties and problems of life are also spoken of by some as their "reactions" to the situation in which they find themselves involved. It should, however, be recognized clearly and candidly that when such responses are termed " reactions " the term is not used equivocally, but only analogously with " reflex actions." For here we know by our own experience that between the presentation of the problem and its final solution by a given course of action there is interpolated a great deal of mental process which does not belong to the reflex arc. To identify such human responses with reflex action or concatenated reflex action serves only to confuse problems which must be distinguished and given separate treatment and specific terms.

In order to clearly understand the problem of stimulus and response it is best for us to analyze it, pick out a type of relation between the two phenomena that we shall regard as a typical reflex action, and then discuss other related modes of behavior. And when we do so let us bear in mind that we are studying reflex action not as a physiologist might do, but from the psychological point of view in order to understand clearly the nature of a reflex action; and so be better able to judge whether or not reflex action is a unit which when multiplied *n* times by itself is capable of explaining all human behavior.

2. Typical Examples of Reflex Action.—When one strikes the tendon of the *quadriceps femoris* just above its insertion into the head of the *tibia* the muscle contracts, giving rise to the phenomenon familiarly known as the knee-jerk. Here we have a

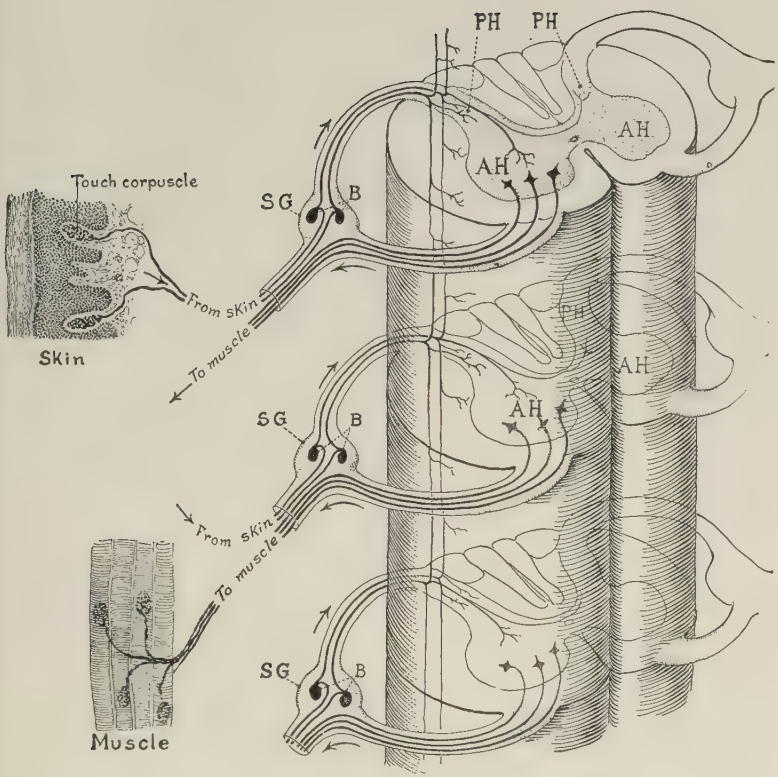


FIG. 1.—DIAGRAM OF A SIMPLE SPINAL REFLEX.

In a simple spinal reflex the impulse is taken up by the "receptor," that is, the nerve endings of a sensory area, *e.g.*, the touch corpuscles of the skin. It is transmitted by sensory nerve fibres to their cells of origin, the bipolar cells (B) in the ganglia (SG) of the posterior roots of the spinal cord. Fibres pass from these bipolar cells to the spinal cord, where they divide into shorter descending and longer ascending branches. These branches give off terminal fibres, which end around cells in the posterior horns (PH) of the gray matter in the spinal cord, or which pass directly to the motor cells in the anterior horns (AH). Outgoing fibres from these motor cells pass directly to the "effector," *e.g.*, a muscle, which responds by a "reflex" contraction to the stimulus.

sensory stimulus, the transmission of this stimulus to the spinal cord,[1] and in mechanical sequence the contractions of a definite group of muscles without any effort on the part of the will. Similarly if one draws a pin across the abdomen the abdominal muscles contract. If one stimulates by rubbing or pinching the skin of the neck, the pupil dilates. If one throws a light into the eye, its pupil contracts. In the knee-jerk, the abdominal reflexes, and the dilatation of the pupil, the sensory impulse passes over into a motor response in the spinal cord; in the reaction of pupillary contraction, the centre is situated in the mid-brain.

3. **Analysis of Reflex Action.**—If we attempt to pick out the chief characteristics of the phenomena under consideration we see that:

I. Reflexes are reactions, not of the organism as a whole, but of a mechanism possessed by an organism.

II. They are localized in and dependent upon the integrity of a series of anatomical units: (a) The sensory receptor, (b) the neural path, (c) the muscle of response. If any one of these elements is not functioning the reaction does not take place. If all these elements are intact, contractions take place mechanically and without delay once the stimulus is given. They are not necessarily dependent on the life of the organism as a whole. Thus, the frog, whose muscles and nervous system are less dependent on the circulation of the blood than those of warm-blooded animals, may be beheaded and disemboweled and reflexes still obtained from the neuromuscular mechanism that remains.

III. They are initiated by stimuli that come from without and not by vague internal conditions of the organism. These internal conditions may modify reflexes, but they do not initiate them.

IV. They are not dependent on the stimuli involved becoming conscious. Reflexes may be obtained from those who are asleep or unconscious.

[1] Some deny that the stimulus is transmitted to the cord and say the *phenomenon* is due to a direct mechanical excitation of the muscle. They therefore decline to regard it as a reflex. The best evidence is, however, on the other side and the knee-jerk will serve very well as an example of a spinal reflex. (See Nagel, *Handbuch der Physiologie*, IV, p. 284.)

v. They are not dependent on the will for their initiation but solely on the stimulus.

vi. They are inherited mechanisms and not habits developed by experience. Thus all normal members of a given species possess the same set of reflexes.

vii. They can exist in the strict sense only in animals with a central nervous system.

4. **The Forms of Reflex Action.**—Not all reflex actions have as their end-result a movement. Acid introduced into the mouth produces a flow of saliva; increase in temperature of the air around the body stimulates perspiration. We thus have *secretory reflexes* as well as *motor*. *Motor reflexes* are of two kinds according as they involve *striated* muscle over which the will has control, or *non-striated* muscle which it cannot directly influence. The knee-jerk would be an example of the former, the pupillary reflex of the latter. Besides the reflexes resulting in a movement we have others that stop a movement or keep one from taking place. The most familiar example of this is the inhibition of a sneeze by rubbing the nose. Electric stimulation of the vagus nerve slows the heart. The mechanical stimulation of the vagus terminations in the lungs at the end of inspiration possibly has something to do with inhibiting the contraction of the diaphragm and allowing expiration to take place. These *inhibitory reflexes* constitute a very important set of mechanisms. One might also distinguish reflexes as *normal* and *pathological*, thus the normal result of stimulating the external region of the sole of the foot is a flexion of the toes; but when there has been an injury of the motor cells in the brain or their fibres in the cord—that is to say, an involvement of the pyramidal tract—stimulation of this region leads to an extension of the big toe and not a flexion.

5. **The Neurological Mechanism of the Pupillary Reflex.**—It is maintained by some that instincts and reflex actions are really one and the same thing, the difference being, that a reflex action is a mere element, a single link, and the instinct a combination of these elements or a chain of reflexes. Others maintain that all thought is to be identified with some kind of reflex action. This being the case, it may be worthwhile to examine a fairly

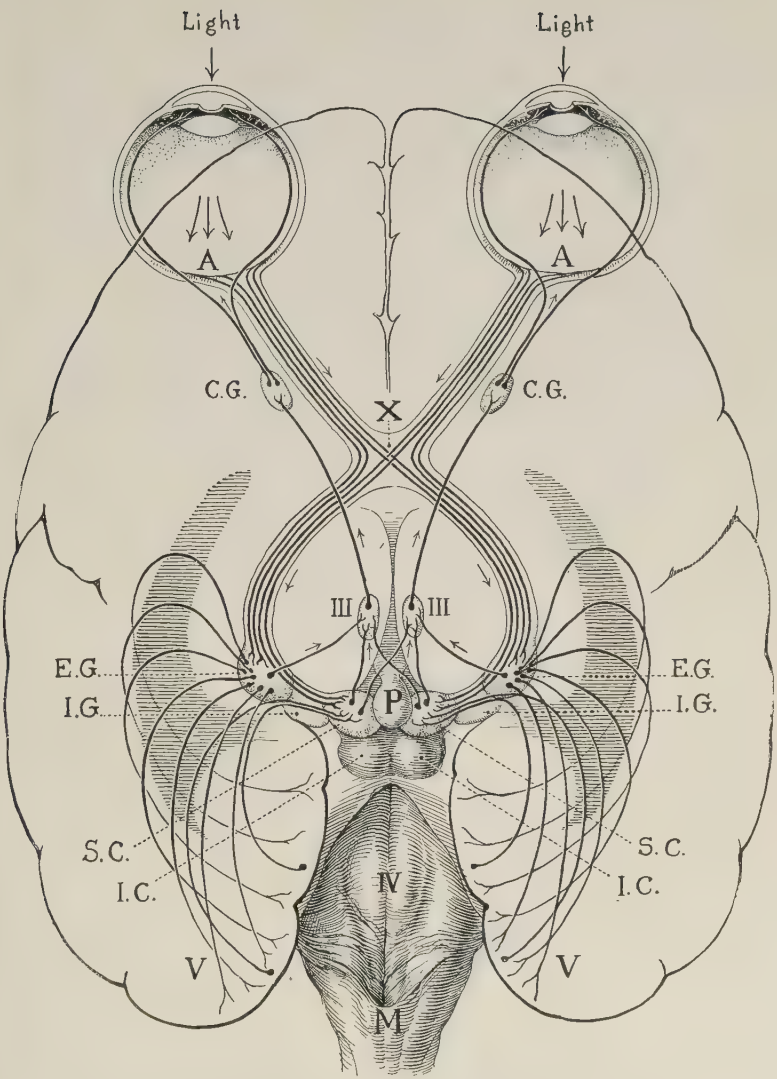


FIG. 2.—NEURAL PATHWAY OF THE PUPILLARY LIGHT REFLEX.

A, retina; CG, ciliary ganglion; X, optic chiasm; P, pineal body; EG, external geniculate body; IG, internal geniculate body; SC, superior colliculus; IC, inferior colliculus; III, nuclei of oculomotor nerve; IV, fourth ventricle; V, visual centre. For the sake of orientation the cerebrum is shown in outline and the position of the lateral ventricles indicated by shading.

complicated reflex in detail so that we may be better able to judge whether reflex action involving a series of neurons may serve for the basis of our explanation of instincts and the thought processes. For this purpose we may examine minutely the mechanism of the light reflex of the pupil. The receptor of this reflex is the retina of the eye, and the effector, the muscles of the iris. The iris has two sets of muscles, one of which radiates like the spokes of a wheel and the other constitutes a series of concentric bands. When the radiating fibres contract they dilate the pupil. When the concentric bands contract they narrow the pupil. When the rays of light fall upon the eye they illumine the iris before they strike the retina. This illumination apparently has no direct and immediate effect on the muscles of the iris, for when the optic nerves are destroyed by tumor growth or trauma, light produces no change in the size of the pupil. In the retina, a region that extends about three millimetres beyond the point of clearest vision, is the receptor of the light reflex.[2]

Since in the point of clearest vision we have only cones, it has been suggested that the cones are receptors for the light reflex. This supposition receives some confirmation from the fact that the contraction of the iris is a function, not of the absolute intensity of the light, but of the state of adaptation of the eye. Now it is known that the cones vary in length with the degree of the illumination to which they are subjected. The extent to which the iris contracts varies also with the intensity of the illumination. It is possible that this coincidence may be in some manner a causal connection so that the cones are the receptors for the light reflex in the eye.

From the retina the path of this reflex is through the optic nerves. It is probable that the fibres which mediate vision and those which mediate the light reflex are different. At all events, there are at least two types of fibres in the optic nerve. It is supposed that one of these is the path of the light reflex. When these fibres come to the optic chiasm most of them cross and pass to the superior colliculus and external geniculate body of the op-

[2] Hess, "Untersuchungen uber die Ausdehnung des pupillomotorisch wirksamen Bezirkes der Netzhant," *Arch. f. Augenheilk,* 1907, LVIII.

posite side. The rest pass to the symmetrical ganglia of the same side. In these ganglia they have connections with the medulla oblongata and meet also centrifugal fibres from the cortical area of vision. From each superior colliculus there proceed two sets of fibres, one going to the oculomotor nucleus of the same side, the other to the oculomotor nucleus of the opposite side. We thus have a double crossing, one in the afferent and the other in the efferent path. The result of which is that stimulation of one eye affects the iris of both eyes, but more strongly the iris of the side stimulated. From this neural mechanism we understand at once the direct[3] and consensual[4] light reflex. It is known also that the iris dilates under stress of emotion, for example, fear; with any act of attention involving mental work such as addition, multiplication, etc. It is possible that this dilation is at times due to a relaxation of the constrictor and not to a contraction of the dilator of the iris. In this case we can understand the function (relaxation of tonus) of the centrifugal fibres to the superior colliculi. The iris also contracts when the eyes converge in looking at a near body. The neural pathway for this reflex of accommodation probably involves some portions of the pathway just outlined. The mechanisms for the two reflexes cannot, however, be identical because in certain pathological conditions the light reflex is lost while the accommodation reflex is retained (Argyll-Robertson pupil). The exact pathway for the accommodation reaction is not so well known as that of the light reflex.

There is another pathway which has to do with the dilatation of the pupil. The fibres of this pathway pass down the pyramidal tract of the spinal cord leaving it in the region of the eighth cervical and first and second dorsal segments. They pass thence to first thoracic ganglion, thence upwards to the inferior cervical ganglion and thence still further to the superior cervical. Here these fibres probably terminate and a new neuron continues the course of the reflex. A little beyond the superior cervical ganglion, separating themselves from the fibres that go to form the carotid plexus, they pass to the gasserian ganglion. Thence they

[3] Contraction of the pupil due to light thrown on the same eye.

[4] Contraction of the pupil due to light thrown on the opposite eye.

continue with the first branch of the trigeminal nerve and pass ultimately by the long ciliary nerves to the eye. It is this pathway which actively dilates the pupil. It has a connection in the cord with the sensory nerves from the skin of the neck, the stimulation of which causes the pupil to dilate. In this outline we have mentioned only the anatomical mechanism which is nothing more than a shell in which very complex physiological processes take place. Thus some drugs affect in a physiological manner the contractor, others the dilator muscle of the iris. What these physiological processes are is practically unknown to us.

The time consumed in the passage of the stimulus of light from the retina to the ganglionic centres and out again to the muscle of the iris is about 0.30 to 0.50 second. This is a relatively long reflex due possibly to the complicated pathway and also to the character of the smooth muscle of the effector. The time of the knee-jerk is only one-tenth of this, that is to say, 0.040 second.

Other reflexes which we shall consider later under the name of "cortical reflexes," involve an even more complicated path than the pupillary reflex. But no matter how intimate our knowledge of the path of a reflex action this alone does not enable us to understand what takes place in the centre controlling the reflex. If this knowledge of the path does not clear up the problem of the central phenomena even in the reflex, we cannot expect to throw much light on the inner side of human behavior by referring to α-, β- and γ-arcs, particularly when so little is known about the higher arcs of the cortical reflexes. But were the pathways known exactly this knowledge would not explain the motives of an individual's conduct.

6. Control of Reflexes.—It is characteristic of reflexes that we have over them no immediate voluntary control. Our indirect control is meagre and imperfect. An attempt to exert this control may be made along the following lines:

(1) Relaxation of the effector. If a muscle is sufficiently relaxed it does not give a reflex contraction. Thus, if the leg is straight, the *quadriceps femoris* tendon is so lax that a reflex cannot be obtained by tapping it. In this way it would be possible indirectly to prevent the reflex taking place even when the stimu-

lus is given. A similar method can be made use of to control an attack of hiccoughs. If one notes by a second hand the approximate intervals of each hiccough and when the critical moment is expected attempts to relax the diaphragm, he can very soon bring these reflex spasms to an end.

(II) Contraction of the effector. Tendon reflexes which are not strongly developed may easily be inhibited by a slight contraction of the muscles involved. Thus, in normal individuals it is usually impossible to obtain the biceps and triceps reflexes unless the muscles are relaxed. Anything above their normal tonus interferes with the reflex.

(III) Attention to the expected movement. Fixing our mind upon the movement of the reflex seems in some manner to interfere with it. Thus, it is much easier to obtain a reflex from another than from ourselves. In cases where the knee-jerk has almost disappeared it may be obtained by the so-called method of reinforcement. This is probably nothing more than a distraction of the patient's attention. He must close his eyes, hold his hands together and try to pull them apart. When a patient does this, a reflex which could not otherwise be obtained is often promptly elicited.

(IV) Stimulation of another receptor. This was the first known method of inhibiting a reflex. It was pointed out in the eighteenth century that a sneeze may be prevented by rubbing the nose. Just what the mechanism of this inhibition is we do not know, but it is one of the indirect methods of controlling reflexes. A sneeze, however, is not one of the simple reflexes we have been here considering, but it belongs to the cortical reflexes we shall consider later.

7. Origin of Reflex Actions.—When we look at the reflexes of any organism we are struck in general by their purposeful character. Thus, the eyelid reflex protects the orbit from injury. The light reflex of the pupil safeguards the retina from the effects of too great an illumination. Swallowing is a reflex absolutely essential to the life of the organism, and equally necessary are all the subsequent reflexes involved in carrying the food to the stomach and through the intestines with the flow of gastric juices, pancreatic secretions, etc. There are, however, some reflexes in

which we can see no utility. For example, the pathological Babinski, that is, the extension of the toe on stimulating the outside of the sole of the foot. Some are tempted to attribute the acquisition of all these reflexes to a Darwinian process of natural selection. We cannot, however, imagine an animal existing in whom from the beginning they were all lacking. They are a part of life itself and are just as mysterious as living organisms. Furthermore, considerable doubt has been thrown by Mendelism on the inheritance of acquired characteristics. It is best, therefore, for us to face our ignorance on this problem rather than to indulge in idle speculations. We do not know how reflexes originated. We cannot conceive of an organism existing without them. They come to the individual from the germ plasm itself. How the germ plasm originally arose nobody knows.

Pavlov recently attempted to prove (*Science,* LVIII, 359-361) that conditioned reflexes (cf. *infra,* p. 68) may be inherited. Mice were trained to run to a feeding place at the sound of a bell. To learn this trick the first generation took 300 lessons, the second 100, the third 30, the fourth 10, the fifth 5. "I think it very probable," he says, "that after some time a new generation of mice will run to the feeding place on hearing the bell with no previous lesson." These results, at their face value, suggest that habits acquired by parents may be transmitted to offspring. Pavlov did not exclude, perhaps, all sources of ambiguity in his experiments, *e.g.,* selection. Are animals that result from generations of laboratory breeding a mentally selected group due to weeding out the less fit? Two independent pieces of research reported by MacDowell and by Vicari (*Science,* LIX, pp. 302-3) failed to find any evidence of the inheritance of training. There is as yet no good evidence that conditioned reflexes can be inherited.

8. **Cortical Reflexes.**—Most of the early information about reflex action was obtained from experiments on frogs from which the cerebral hemispheres or the entire brain had been removed. Naturally, the reflexes originally known were those that could be obtained from the spinal cord. The spinal cord, therefore, was looked upon as the centre *par excellence* for reflex action. It was not known that the brain had anything whatsoever to do with reflexes. Various attempts to stimulate the brain, as one stimulates nerves, were at first entirely fruitless. It seemed that the

brain could be cut and burned without any immediate effects whatsoever. It was not until 1870 when Fritsch and Hitzig made their historical experiments that it was realized that there are centres for movement in the cerebral cortex. Experiments since then, supported by clinical observation and pathological studies of cortical injuries and brain tumors have shown that there are a number of so-called centres in the cortex. If a certain centre is injured, a definite movement cannot be executed. If other centres are destroyed, a peculiar type of blindness or deafness results. It thus became apparent that if the brain has sensory and motor centres, the cortex as well as the cord can function in the reflex arc. Thus, the cortical reflex came to take its place along with the spinal reflexes.

As typical examples of cortical reflexes, one may mention sneezing and coughing. Unlike spinal or cerebrospinal reflexes above mentioned, the cortical reflex is characterized by the fact that consciousness and voluntary effort are more or less important factors. Thus, for instance, if one is unconscious he neither coughs nor sneezes, but his eyes still react to light, his tendon reflexes, etc., may still be obtained. It is necessary that the stimulus that initiates the cortical reflex should be perceived in order that it may be effective. It is customary to regard consciousness as connected with some kind of cortical activity. When, therefore, we find a reflex which does not take place unless the stimulus is perceived, we have a right to differentiate it from the others and designate it as a cortical reflex.

Since the days of Fritsch and Hitzig numerous experiments have been made on the brains of animals to discover what regions may be stimulated in order to produce the various activities which go to constitute the physiological functioning of the organism. It is thus possible to obtain by stimulating the proper regions the secretion of saliva, tears, the gastric juices, the retardation, deepening, or acceleration of respiration, changes in blood pressure, etc. More recently Bechterew has put forward the interesting view that the centres for movement and sensation are always intimately connected. There is no movement centre that is not closely associated with its sensory region, and *vice versa*

no sense organ that has not in the immediate vicinity of its cortical centre a region the stimulation of which produces the appropriate movements of the sense organ. For example, the precentral gyrus is the motor region for the various members of the body. Immediately behind this is the postcentral gyrus with tactile centres for the organs involved in movement. This fact is one that is known and generally admitted by physiologists. Over and above this, Bechterew claims that he has found in the neighborhood of the cortical visual area a centre the stimulation of which produces eye movements, narrowing and dilation of the pupil, contraction and relaxation of the muscles of accommodation. In the vicinity of the auditory area, or more precisely, toward the posterior region of the fissure of Sylvius he has obtained movements of the ear, the eye, and the head. In the olfactory region he obtains contraction of the nostrils and movements of respiration. In the vicinity of the gustatory region, which he locates in the posterior region of the operculum, he find that stimulation produces salivary secretion. In the central region he obtains movements of the stomach, intestines, gastric, lactic, and sweat secretions.[5]

On the basis of the fact that the sensory and motor centres are intimately connected, Bechterew builds up the hypothesis that all thought, all psychic, and all mental phenomena are psychic reflexes, that is to say, reflexes that take place in the cerebral cortex. When one looks for a demonstration of this identity, it is not forthcoming, and when one inquires a little more closely into what he means, we find that he has made no advance upon the old materialistic concept that the psychical is an epiphenomenon of the physical. We have always known that there are afferent sensory processes and efferent motor ones. The great mystery has always been how the physical stimulus passes over into the mental state of the sensation. To tell us that sensory and motor centres are somewhat closer together in the cortex than has hitherto been supposed does not help to elucidate this mystery.

[5] See Bechterew's interesting summary of the work of himself and his pupils, "La localisation des psycho-réflexes dans l'écorce cérébrale," *Scientia*, 1916, XX, pp. 444-457.

9. **Psychic Reflexes.**—The term " psychic reflexes " which Bechterew employs is not new. It was used in 1882 by Charles Richet in his *Physiologie des muscles et des nerfs.*[6]

Bonatelli claimed[7] priority in the use of the term, referring to his work, *La coscienza ed il meccanismo interiore,* Padua, 1871.

Richet pointed out[8] that Griesinger used the term in 1846 (*Arch. fur physiol. Heilkunde*). In 1863 the Russian physiologist, Sétchénoff, in his study entitled *Reflexes of the Brain,* put forward the theory that thought is a reflex action, saying that " thought is the first two-thirds of a cerebral reflex."[9] In the behaviorist school of the present day, it is usual to identify conscious phenomena with a reflex of higher order. Thus, if the simple reflex be regarded as an α-arc extending from sense organ to cord and out again to muscle or gland, the conscious phenomenon is a β-arc passing from subcortical centre to cortex and thence outward by efferent channels.[10] The psychic reflex, according to this school, is the conscious process.

By way of criticism, one might suggest that the recognition of another arc is justifiable from the facts of cerebral histology and physiology. No sensory neuron passes directly to the cerebral cortex. Between the skin and cortex, for example, there are relay stations in the medulla and thalamus. Thus several arcs may be involved in the process by which a stimulus becomes conscious.

It does not help us, however, to say that consciousness *is* the *n*th arc. The *n*th arc in its anatomy and physiology is as far removed from the characteristics of mental life as the first arc. That the cortical arc is more intimately connected with a stimulus *becoming* conscious appears likely from the general facts of cerebral physiology, but not from its numerical order nor from the

[6] See also: " Les réflexes psychiques," *Revue Philosophique,* 1888, XXV, pp. 225-237, 387-422, 500-528.

[7] *Revista Italiana di Filosofia,* 1887, II, pp. 326-328.

[8] " Actions réflexes psychiques," *Bull. de la soc. de psychol. physiol.,* 1887, III, pp. 54-55.

[9] *Vide* V. Kostyleff, *Le mécanisme cérébral de la pensée,* p. 5.

[10] Cf. E. P. Frost, " Cannot Psychology Dispense with Consciousness? " *Psychol. Rev.,* 1914, XXI, pp. 204-211.

fact that when it is broken the stimulus does not become conscious. For the first arc may be broken and the stimulus will never reach consciousness. To know in a vague way, but with positive certainty, that two things are in some manner related does not justify one in identifying them. Father and son are related, but the father and son are not identical. Day and night are related, but day and night are not identical. Cortical reflexes and conscious phenomena are related, but cortical reflexes and conscious phenomena are not identical. If, therefore, by a *psychic reflex* is understood some kind of β-arc or γ-arc, which is a mental state, one is justified in discarding the term until some evidence is brought forth that would justify its use. It is better to say we do not know how consciousness is related to the nervous system than to make hasty and unwarranted generalizations.

The term psychic reflexes, as used by Richet, included two groups of phenomena:

(a) One group he termed reflexes of accommodation; the typical example that he gave of this group was the contraction of the ciliary muscle changing the curvature of the lens. This phenomenon depends, he says, on a consciousness of the stimulus—an appreciation of the distance of the object.

(b) In the other group, he included the bodily resonance of the emotions, change in heart rate and respiration, blushing, etc.

Though these latter phenomena take place independently of the will, it is best not to confound them with reflexes. A reflex should follow mechanically upon the presentation of the stimulus and be caused by the stimulus. The bodily resonance of the emotion is caused, as we shall see, by the emotion and not by the stimulus. Its cause is much more complex than that of the reflex. In the interest of clarity, therefore, it is best not to designate these phenomena by a common name.

The term psychic reflex seems, therefore, to be superfluous for when we analyze the phenomena to which it may be applied, we find it coextensive with the term cortical reflex. We have seen that this term applies to a certain class of reflex actions in which the stimulus must be perceived in order to be effective and over which the will has some control. A sneeze does not take place

in one who is unconscious, a cough is consented to by the will. Psychic reflex, therefore, is synonymous with cortical reflex.

The Conditioned Reflex.—The concept of the conditioned reflex had its origin in Pavlov's experiments on the secretion of saliva in dogs. He found that saliva is not only secreted when food is placed in the mouth, but also when food is merely shown to the dog. Furthermore, the chemical character of the saliva varies with the food. Watery food produces a very slight flow of saliva, whereas meat will produce a flow of saliva rich in mucin, a digestive ferment. If a pebble is placed in the dog's mouth, he moves it about a little and drops it out. The pebble causes no secretion of saliva. If sand, which is chemically identical with the pebble, is put in a dog's mouth, a flow of watery saliva is prompt and plentiful. If sand is shown to the dog, the same flow of a watery saliva results. It is, therefore, evident that not only sensations coming from the tongue and mucous membranes of the mouth cause a reflex secretion of saliva, but also sensations from the eye. If sounds are associated with the feeding of animals, even the ear will give rise to a reflex secretion of saliva. Whereas food placed in the mouth never fails to call forth a secretion except in conditions of fear, etc., the sight of food will only produce a secretion of saliva when a number of conditions are fulfilled. If, for instance, the dog is shown meat again and again but it is not given to him, the amount of saliva secreted diminishes with each presentation of the meat until finally no more saliva is secreted.

Pavlov distinguished, therefore, between two types of reflex action: (1) The organic or unconditioned reflexes, those, namely, that take place promptly and immediately and constantly whenever the appropriate end organ is stimulated; and (2) the psychic or conditioned reflexes which take place only if a number of conditions are fulfilled.[11]

Bechterew extended Pavlov's work of salivary secretion to the voluntary muscles and found that conditioned reflexes may be

[11] *Psychische Erregung der Speicheldrüsen. Ergebnisse der Physiologie,* 1904, III, Abt., 1, pp. 176-193.

obtained not only in salivary glands but also in the voluntary musculature.

Kostyleff hailed this as demonstrating that " acts generally considered as spontaneous and free can be associated with external stimuli and produced in the same manner as reflexes."[12]

He even went so far as to maintain that the reflexes studied by Pawlow and Bechterew are the essential elements of our mental images and ideas.

Watson hailed the conditioned reflex as a long-desired method that could supplant introspection in phychology.[13]

The school of Behaviorism suggested that all human behavior was nothing more than conditioned and unconditioned reflexes.

Hamel[14] first measured the latent period of the conditioned reflex and found it for human subjects to average between .200 and .300 of a second. He compared it with the time of a voluntary reaction which involved a discrimination between a bell and the sound of a falling hammer as a stimulus to react. He found that the latent times of the conditioned reflex and a choice reaction, dependent upon conscious discrimination, were about the same.

Cason,[15] at Columbia University, repeated Hamel's work, using the eyelid reaction rather than a movement of the arm. He found that the voluntary reaction was in general longer than the conditioned reflex, though in one case it was practically the same or even a little quicker. He looked upon the difference in time as proving an essential difference between a voluntary reaction and a conditioned reflex. It is to be noted, however, that all his conditioned reflex reaction times are close to .200 of a second and perfectly capable, as far as time limit is concerned, of being merely voluntary reactions. It is possible too that his instructions to his subjects—" Listen attentively for the sound of the stimulus"—produced in his subjects the attitude of the

[12] *Le mécanisme cérébral de la pensée*, Paris, 1914, p. 15.

[13] " The Place of the Conditioned Reflex in Psychology," *Psychol. Rev.*, 1916, XXIII, pp. 89-116.

[14] " The Conditioned Reflex," Catholic University of America Studies in Psychology, *Psychol. Monographs*, Vol. 27, No. 1.

[15] *Journal of Exp. Psychol.*, 1922.

sensory reaction. We know that attention to the stimulus in a reaction-time experiment gives a longer reaction than attention to the movement. Any instructions, which accentuate the stimulus rather than the movement, have a tendency to lengthen the reaction. Cason's results, therefore, with the eyelid reaction do not demonstrate that the so-called conditioned reflex is anything more than a voluntary reaction dependent upon consciousness.

Watson has laid great stress upon the fact that a conditioned reaction may be obtained with muscles not subject to voluntary control, like those in the iris. Thus, the pupillary reaction appears to afford an opportunity of obtaining a conditioned reflex which cannot be the product of conscious and voluntary factors but must be a true reflex movement.

Cason experimented with the pupillary reaction and found that he could condition a reflex either to dilatation or contraction of the pupil. His experiments, however, departed somewhat from the ordinary procedure. For instance, a light was thrown on the pupil and while the pupil was contracting, a bell was sounded. Under such conditions he found that contraction of the pupil to the light while the bell was sounding was greater on the average than a contraction due to the light alone. After the subject had been subjected to 400 experiments, in which the bell was sounded and the light turned on, the difference was still more marked, when he compared the average to light alone with that to light plus bell. It is possible, however, that repetition has here accentuated the normal reflex and the difference is accounted for also, in part, by an overflow of energy of the sound stimulus that accentuates the activity of a mechanism already in operation.

A pupillary reaction, furthermore, in spite of its involuntary character, is nevertheless indirectly subject to voluntary control. Every act of attention dilates the pupil. Every emotion does the same. Looking at a far point dilates it; looking at a near point or wrinkling the forehead[16] contracts it. It is very likely

[16] Cf. E. Schlesinger, "Pupillen Verengerung durch willkürliche Muskelbewegung," *Deutsch med. Woch.*, xxxvii, pp. 1748–49.

that, as Hamel suggested, many of the experiments that were supposed to demonstrate conditioned pupillary reactions merely manifested the effect of apprehension on the size of the pupil. It has not yet been clearly demonstrated that the so-called conditioned reflex is in any sense of the word a reflex action.

Pavlov's experiments with the dog do not necessitate a mechanical explanation. The disappearance of the secretion of saliva when meat is shown to a dog repeatedly without giving it to him bears an easy explanation in mental terms. The psychic salivary reflex is dependent on the immediate expectation of food. When it is found that one may see food and not obtain it, expectation dwindles and with the dwindling of the expectation the salivary secretion disappears. Pavlov, however, conceives of it as being due to a fatigue of the nervous system. He thus explains it:

"What is the physiological explanation to the rapid and constant disappearance of the relative reflex[17] by the repetition of the experiment and its rapid recuperation under certain circumstances? Certain facts seem to show that this phenomenon belongs to the category of the facts of exhaustion. First, the relative reflex disappears and at the end of a certain interval reappears spontaneously. In the second place, the repetition being made with a more rapid rhythm, the relative reflex disappears more quickly than with a slow rhythm. This explanation squares well with the opinion generally admitted as to the great fatigability of the superior centres for monotonous and repeated excitations. The fact of the reëstablishment of the relative reflex after a flow of saliva brought on by an essential reflex, or even by another relative reflex sufficiently intense, can be explained in this fashion, that in spite of a certain degree of fatigue of the higher nervous centre, its excitation penetrates once more to the inferior salivary centre just as soon as the paths are opened by

[17] In this article Pawlow does not use the term "conditioned reflex," but speaks of relative reflex instead. In the article published a few months later in the *Ergebnisse der Physiologie* (1904, III, Abt., 1, pp. 176-193), he introduces the term "conditioned reflex."

means of a recent and intense excitation of this latter inferior centre."[18]

Such an explanation is necessary only if we assume that animals are mere automata, not having anything akin to consciousness. Everything could be easily explained psychologically by expectation or loss of expectation of something good or bad being put in the mouth. The conditioned reflex, instead of banishing introspection and explaining consciousness in voluntary action, itself demands an explanation.

[18] Pavlov, J., "Sur la sécrétion psychique des glands salivaires," *Archives Internationales de Physiologie*, I, 1904, pp. 119-135.

CHAPTER II

REFLEX ACTION AND REACTION-TIME EXPERIMENTS

Reflex action bears a certain resemblance to the experiments on reaction time which have been so carefully studied in our pychological laboratories. Reaction time is the interval that elapses between the appearance of a stimulus and the observer's response by a prearranged movement which he endeavors to make at the very instant of observation.

The Personal Equation.—Psychological interest in this interval was preceded by the observations and researches of the astronomers. When the astronomer, in his observatory, wished to record the moment of transit of a star, he used to start counting the strokes of a pendulum just before the expected interval and watch for the moment in which the star passed the cross-hairs in his telescope. In 1795 Maskelyne, the Royal Astronomer of the Greenwich Observatory, discharged his assistant, Kinnebrook, for what Maskelyne thought was inaccuracy in his observations, which were registered from 0.5 to 0.8 second too late. He reported this fact in the Greenwich Astronomical Observations.[1] In 1816, Lindenaid writing out the history of the Greenwich Observatory in the *Zeitschrift für Astronomie* referred to this incident. It attracted the attention of the celebrated German astronomer, Bessel, who undertook a careful investigation of the difference in the times of stellar transits as measured by various observers. This difference was referred to as the " personal difference," or the " personal equation." All the early investigators dealt with the relative, not the absolute personal equation. That is to say, they determined how much one observer differed from another; but how far each missed the true time of transit remained entirely unknown. It was not until the American astronomers of the Coast Survey invented the chronographic method of recording electrically the time of transit that it became possible to measure

[1] III, 1795, 319, 339, *Fide* Sanford. *Am. J. Psychol.*, Vols. I and II.

the absolute personal equation. This was done by Professor Mitchel in 1856[2] by the use of an apparatus in which an artificial star recorded its actual transit electrically and the observer his observation of its passage in the same manner. He found the absolute personal equation amounted to something over a tenth of a second.

The problem of the absolute personal equation was taken up by psychologists under the name of reaction time. It was analyzed by them into several components, (a) the inertia of the peripheral sense organ, *i.e.,* the time taken for the stimulus to act upon the organ of sense and transmit its action to the conducting nerve; (b) the time of conduction in the afferent nerve, *i.e.,* nerve from sense organ to brain; (c) the inertia of the cerebral centre, *i.e.,* the time taken to receive the stimulus and discharge it into the efferent nerve; (d) the time of conduction in the efferent nerve, *i.e.,* the nerve from the brain to the muscle; (e) the inertia of the organ of response, *i.e.,* the time requisite for the development of a muscular contraction that will operate the recording apparatus.

Muscular and Sensorial Reactions.—It was soon noticed that reaction time varied with the subject or the observer. With some it approximated a tenth of a second, with others it was a fifth of a second or longer. This difference was pointed out by Ludwig Lange in 1888.[3] The shorter type of reaction was termed muscular, the longer sensorial.

Lange looked upon the series of events in a reaction-time experiment as a cerebral reflex which differs from an ordinary reflex because a preceding act of the will is necessary to clear the path for the stimulus that it may pass to the muscle of contraction. Lange attributed the difference in time between the two types of reaction to the involvement of two different centres. The sensory reaction, according to him, had its centre in the cortex—the muscular reaction in a subcortical centre. He suggested that the cerebellum might be the subcortical centre involved. Wundt

[2] *Journal of The Franklin Institute,* 1858, 66, 349. *Fide* Sanford.
[3] *Philosophische Studien,* IV.

thought, on the contrary, that the two centres were both in the cortex.

Some evidence on this point can be obtained by instructing the subject to make the movement of response as quickly as possible, and by measuring the speed of this movement (a) in a sensorial reaction, (b) in a muscular reaction, and (c) in a voluntary movement initiated at will and not in response to a stimulus. When one does this it is found that the speed of movement is the same in all three cases within the limits of the probable error.[4] Insofar as one can assume that the maximum effort of cortical and subcortical centres would discharge the ganglion cells in the anterior horn of the spinal cord with different intensities, insofar is the above fact evidence that the cerebral centres in muscular reaction are not so widely separated as cortex and subcortical ganglia.

The probable source of the variation in time between sensorial and muscular reaction is, as Wundt suggested, a difference in the distribution of the attention. When one is waiting to react, a motor discharge is prepared and at the same time inhibited from immediate execution. Attention may be concentrated on the expected stimulus or on the intended movement—if on the stimulus, the inhibitory process is at a maximum; if on the movement, it is at a minimum and so disappears more quickly with a consequent shortening of the reaction time.

Cortical Reflex and Reaction-time Experiments.—There are certain points of resemblance between cortical reflexes and the reaction-time experiments. Thus, in both there is a voluntary element. In a sneeze, for instance, the final expulsive movement comes, as a rule, with the consent of the will. That it should take place at this particular instant rather than a few moments later, when the irritation finally overcomes all resistance, is due to a voluntary act which allows *hic et nunc* a stimulus to have its natural mechanical effect. In the reaction time the stimulus is effective because the will has some time before accepted a certain task—to react when a stimulus is perceived. Throughout

[4] Cf. T. V. Moore, "A Study in Reaction Time and Movement," *Psychol. Rev. Mon. Supp.*, 1904, Vol. VI, No. 1.

the experiment the will is consciously or unconsciously maintaining this task in mind, the result of which is the preparation of a motor discharge and a temporary inhibition of that charge, so that it will be set off or become effective when the stimulus is perceived. The fundamental difference between all forms of reaction-time experiments and all reflexes lies precisely in the presence of the task in the one, and its lack in the other. The task creates a neural arc for stimulus and response which lasts as long as the task is held in mind by the subject. In the reflex actions this arc is built into the fibre of the nervous system and cannot be eradicated by the will. The will can merely bring into play its inhibitory power to counteract the effects of the stimulus.

Stimulus and Response in Reaction Time.—There is a further analogy between a reflex and a reaction in the fact that the stronger the stimulus the quicker and more violent the reflex response. So also, in reaction-time experiments, the stronger the stimulus the shorter the reaction time. Similarly also, the intensity of the movement is greater when a very loud signal for reaction is given.[5] It would seem at first sight that it is merely a question of utilizing the energy of the stimulus to "overcome resistance" in the central nervous system, and to effect a more violent discharge in the efferent circuit. It is likely that the extra energy of the stimulus in a reaction is utilized in a reflex manner to produce a more violent movement. Until recently it appeared that shortening of the reaction time with increased intensity in the stimulus is merely a question of a stronger stimulus overcoming resistance in the synapses of the central nervous system. But, in 1915, Herbert Woodrow[6] undertook to compare the reaction time to the onset of stimuli with that obtained by reacting to the cessation of stimuli of varying intensities. Thus, he raised the question, how does the cessation of a stimulus effect a reaction?

Sherrington supposes[7] that in reflex action the prolongation

[5] Cf. T. V. Moore, "Reaction Time and Movement," *Psychol. Rev. Monograph Supplements*, 1904, Vol. VI, No. 1, pp. 52-53.

[6] *Psychol. Review*, Vol. XXII.

[7] *Integrative Action of the Nervous System*, p. 21, *Fide* Woodrow.

of the time with decrease in intensity of the stimulus is due to delay in the weaker stimulus making its way from one neuron to the next. Pieron[8] supposes that this delay in reaction time is due to the inertia of the sense organ. In both cases the underlying concept is that there is a certain amount of resistance to be overcome and the stronger stimulus accomplishes the task more readily. When, however, we stop a stimulus we cut off energy. If the question is one of overcoming resistance we should expect some difference in the reaction time to the onset and to the cessation of stimuli. But, as a matter of fact, they are the same. Thus Woodrow got the following results for the "beginning" and "cessation" reactions.

Mode.	Intensity.	Subj.	Beginning Reactions.		Cessation Reactions.	
			Av.	Av. M. V.	Av.	Av. M. V.
Sound	Medium	Ht.	119	16	121	15
Sound	Medium	Vs.	137	17	143	17
Sound	Medium	Sz.	148	19	148	21
Sound	Weak	Ht.	184	26	183	33
Sound	Weak	Vs.	174	20	167	22
Sound	Weak	Sz.	209	33	218	33
Sound	Liminal	Ht.	779	130	745	133
Sound	Liminal	Vs.	875	226	822	168
Light	Bright	Ww.	154	16	151	16
Light	Bright	Ht.	162	21	167	18
Light	Bright	St.	183	21	184	19
Light	Bright	Vs.	192	19	185	17
Light	Bright	Sz.	201	22	201	22
Light	Weak	Ht.	205	33	203	24
Light	Weak	Vs.	243	26	234	21
Light	Weak	Sz.	268	28	250	26

These results are hard to explain on the basis of the resistance concept. One might attempt an explanation by supposing that the change due to the onset and to the cessation of a weak stimulus was transmitted along the nerve fibres more slowly than changes due to a strong stimulus. But experiments show that

[8] "Recherches sur les lois de variation des temps de latence sensorielle en fonction des intensités excicatrices," *L'Année psychol.*, 1914, pp. 17–96.

the transmission of nervous impulses is independent of their intensity.[9] Should not then the change due to a continuous weak stimulus die down more quickly than that due to a strong one and give us the very reverse of the results that Woodrow obtained?

Any attempt at mechanical explanation is very difficult, but the moment we look at the facts psychologically their interpretation is apparent. The difficulty of *perceiving* the onset of the cessation of a weak stimulus is about equally great, for the reaction follows upon a *perception.* A delay, therefore, is in both cases to be expected. But with strong stimuli it is more easy to notice their onset and their cessation, and in both cases we expect and obtain a shorter reaction. Woodrow's experiments indicate that in reaction there is a perceptive element. Some of his reaction times are short enough to be regarded as muscular. It would, therefore, appear that even in muscular reactions there is an element of perception.

Is there a neurological correlate of perception in the reflex? This question cannot be answered without further experimental evidence. It is probable, however, that nothing akin to reactions to *cessation* of stimuli will be found in a reflex machine like the decerebrated frog—or, if found, that it will not obey the law discovered by Woodrow for reactions to the beginning and cessation of stimuli.

[9] Cf. hereon literature cited by Woodrow, p. 437.

CHAPTER III

TROPISMS

General Concept of Tropisms.—The term tropism is used to designate responses of living organisms to simple physical stimuli, toward the source of which they move, or from which they turn away. If the resulting movement is toward the stimulus, the tropism is termed positive; if away from the stimulus, negative. As thus defined the term makes no theoretical implications, but simply refers to the fact that certain organisms do orientate themselves in definite ways in the presence of simple physical stimuli. There can be no doubt as to the existence of the facts and the term aptly designates the responses.[1]

In the minds of some investigators, however, it is always implied that these terms indicate mechanical modes of action or forced movements over which the organism has no control. Thus, Loeb continually refers to the flight of the moth into the candle flame as an example of a forced movement due to heliotropism. He regards it as brought about by the forced turning of the head to the light which is reflexly caused by a greater tonus of the muscles on the illuminated side. The fatal flight is not, therefore, psychologically but mechanically caused. The moth is not curious nor fond of light, as is popularly supposed, but moves with fatal necessity to the flame that burns it. This attitude is adopted by Loeb because he thinks that plants as well as animals are similarly affected by the forces of nature. Plants are not supposed to be affected by conscious factors, therefore animals are acting mechanically when they react to the same forces in the same manner. This is the argument which underlies much of the discussion about the tropisms in animals. We must, however, be

[1] Verworn would substitute taxis for tropisms because the words chemotropism, heliotropism, etc., "nicht bloss schwerfällig klingen sondern auch vom sprachlichen Standpunkt aus Bedenken erregen müssen," *Allgemeine Physiologie*, fifth edition, p. 547. He, therefore, would use instead: Chemotaxis, phototaxis, etc.

careful of arguments based on analogy. If one went into a room with windows at one end only and saw the leaves of the plants all turned to the light, and a group of men gathered at the light reading and writing, he would scarcely be inclined to ascribe to one and the same mechanical tropism this orientation of men and plants to the source of light. Similarly, unicellular organisms may behave toward simple physical stimuli just as multicellular plants do, but that does not mean that analogous behavior indicates one and the same mechanism that brings it about. It may be that there are a number of mechanisms at the basis of heliotropism in animals and in plants, and it may be also that there is in them something akin to what we know in consciousness as pleasantness and unpleasantness, fright, etc., influencing their movements.

At the present day there is a very strict taboo on consciousness being mentioned in connection with animals, and some are attempting to see if they cannot get along without it even in human psychology. This originated in a reaction of scientific investigators against the tendency of popular writers to interpret naïvely animal behavior in terms of human thought and feeling which has grown until it has become a veritable "anthropomorphophobia." Certain teachers refuse to use, or allow their pupils to use, any term that connotes consciousness in treating of animals, and some extremists would extend this even to man. The argument is: If animal behavior can be explained without supposing consciousness as a factor, let us discard the concept entirely and regard the organism as a pure reflex machine. In a similar way one might see a stone fall from the roof of a building to the ground and argue that the fall of this stone *can* be explained in a purely mechanical way as due to the age and crumbling of the building, freezing, etc., and refuse to consider any other possibility. But the explanation might involve a tilt given to the stone by a human hand. And if someone sitting beneath were injured and a murder trial resulted, it would no longer be sufficient to say that the event could be explained as a mechanical effect of the forces of nature and refuse to consider the possibility of a human interference with intent to kill.

At the present day the behavior of animals is by no means so thoroughly understood that we can maintain that it can be entirely explained in terms of mechanical action. It may be highly interesting to attempt the task, but if we want to discover truth and not amuse ourselves, it will not do to assume at the outset that any animal, much less all animals, are pure reflex machines. Our mind must be open to the possibilities on both sides. Our attitude must not be, is it possible to conceive of animal bahavior in terms of purely mechanical elements, but rather one of open-minded research for evidence that will incline us to one conclusion or the other. All questions cannot be decided with absolute certainty. Many important steps must be taken on merely probable evidence. If we can get only probable evidence on the inner nature of animal behavior, it is worth having. It is not justifiable to say: We can never prove that animals are conscious, let us therefore regard them as machines.

If the analogy of structure counts for anything, it is very likely that such a complicated structure as the eye, preserving a similar anatomy and histology throughout the vertebrate kingdom, has, wherever found, a similar function and mediates something akin to what we are aware of in vision. If this analogy be extended to the eye spot on Euglena, we are very likely to be mistaken. If we should say that Euglena and plants, positively *heliotropic to light,* are controlled in their reactions to light by one and the same mechanism, we are again very likely to be mistaken. We should, therefore, approach the problem of tropisms without any assumption of the presence or absence of mechanical factors and make up our minds purely on the basis of the facts that may be observed.

A Typical Tropism.—Let us approach the study by the consideration of a familiar tropism that has been carefully studied and for which there seems to be a good mechanical explanation. The roots of plants are positively geotropic to the force of gravity, the stems are negatively geotropic. No matter how the seed is planted, the stem grows up and the root down. Pull up the growing seedling, put the stem down and the root up, and the root slowly turns down while the stem gradually assumes again the

upright position. This is the phenomenon; what is the mechanism of its explanation? If we study a longitudinal section of the root-tip microscopically, we find in the central portions of the root-cap (the columella) a number of cells, termed statocysts, containing starch grains. These grains rest on the physically lower part of their cells. Each cell contains about twenty-five starch grains—enough to form about two layers in the bottom of of the cell. Being heavier than the protoplasm, they sink under the influence of gravity, always resting on the lower cell wall. It seems possible, therefore, that they may have something to do with the positive geotropism of the root. Is there any evidence that they do?

Haberlandt[2] mentions the following experimental evidence:

(1) If the root-cap, which contains the starch grains, is cut off, its geotropism is destroyed. When the geotropism manifests itself again, starch grains may be found in the wound-callus. This is not due to shock effect, because incision denuding an equal area, but leaving the root-cap intact, does not to the same extent interfere with geotropic curvature.

(2) Nemec imbedded the radicles of *Vicia faba* in plaster of Paris, thereby inhibiting growth and bringing about a dissolution of the starch grains. When the roots were liberated, they resumed growth, but manifested no geotropic curvature till the starch grains in the columella had been regenerated.

(3) By storing onions for several years the roots will become devoid of starch grains. If experimented on at the end of this period, they will not manifest geotropism for several days. When they finally do, microscopic examination will show that the starch grains have been regenerated.

(4) By subjecting stem or roots to a series of vertical impacts from a tuning fork, the geotropic curvature may be accelerated. This is to be expected if the jar caused by falling starch grains is the prime factor.

It would thus seem that in one tropism at least we have a purely mechanical explanation. The ultimate reason why the root

[2] *Physiological Plant Anatomy*, trans. from fourth German edition by Drummond, London, 1914, p. 609 ff.

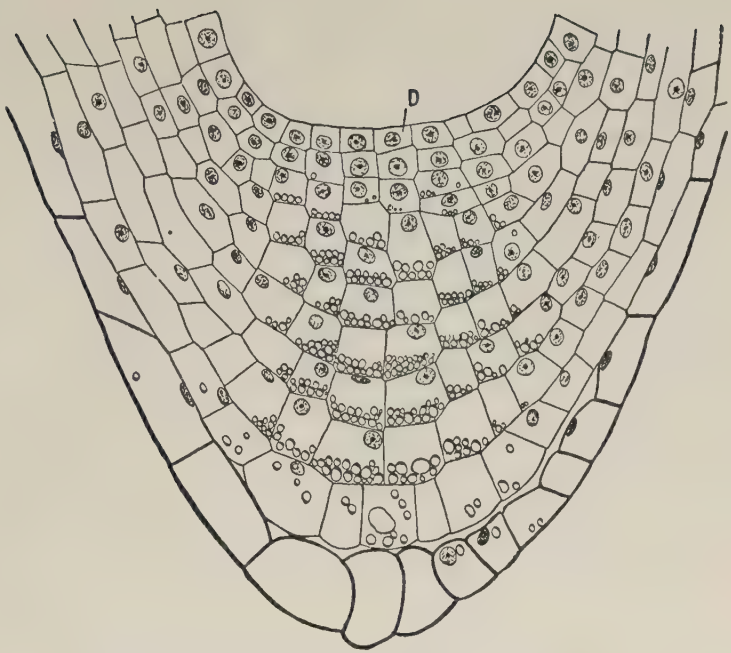


FIG. 2a.—Median longitudinal section through the root cap of an adventitious root of *Roripa Amphibia*, showing starch grains resting on the bottom of the cells. Reproduced from Haberlandt's Physiological Plant Anatomy, Courtesy W. Engelmann, Publisher.

FIG. 2b.—Longitudinal section through a node of *Tradescantia virginica*, displaced from the vertical showing position then assumed by the statoliths. Reproduced from Haberlandt's Physiological Plant Anatomy, Courtesy W. Engelmann, Publisher.

turns to the earth is the force of gravity itself, acting not upon the root as a whole but on microscopic particles in the root. This bending is not only a passive something but a growth, in roots, toward the centre of the earth. It is not clear just why growth in one direction should be stimulated by the presence of the starch grains in the bottom of a cell; but when we remember that mitosis or cellular division takes place in wounds when pressure has been removed on the side of the abrasion and stops when equal pressure has been restored by the epidermis closing over, we have perhaps an indication of the mode of action of the falling starch grains. They cause an inequality of tension in the cell, and growth follows the line of least resistance.

Does it, therefore, follow that all tropistic phenomena in animals and plants are purely mechanical in nature? Not until the mechanism has been demonstrated as the cause of the tropism. Let us examine now the various forms of tropism in animals and plants.

Geotropism.—We have just considered the phenomenon of geotropism in plants. This, we should note, is a bending and a growth by which the bending becomes fixed. There is nothing clearly identical with it in the animal world, but there are a number of things to which it bears a superficial resemblance.

The closest resemblance is in the hydroid, Antennularia. "When the stem of *Antennularia antennina* which normally grows vertically upward, is put into an oblique position in the aquarium, the tip bends until it is again in a vertical position, and then continues to grow in this direction vertically upward."[3] The mechanism of this tropism has not been clearly investigated, and we have no experiments showing the presence of statocysts and their geotropic function such as we have in the case of plant roots and stems. It is probable, however, that an animal, fixed and growing, with the general habitus of a plant and behaving towards gravity in a similar way, has a mechanism to account for its behavior similar to that of the plant.

Connected with the auditory apparatus of many animals are small calcareous particles resting in hairs that are connected

[3] Loeb, *The Dynamics of Living Matter*, 1906, p. 148.

with the vestibular root of the eighth cranial nerve. It is known and it can be demonstrated that in some animals gravity, acting upon these calcareous particles (otoliths) and they in turn upon the hair cells amid which they rest, reflexly maintains the animal in a state of static equilibrium. A curious and interesting demonstration of this was given by Kreidl.[4] The crustacean *Palæmon* loses its otoliths in the process of moulting. It readily makes good the defect by putting sand into its ears. Kreidl hit upon the ingenious plan of placing these crustaceans on a bed of finely divided iron instead of sand. The crustaceans then put the iron into their ears instead of sand. When Kreidl brought an electric magnet near the Palæmon's head, it executed compensatory movements just as it does when the animal is tilted on a board and the force of gravity acts upon it in varying directions. He thus proved that the direction of the line of pressure of the otoliths is the fundamental factor in their reflex maintenance of equilibrium.

How closely, we may ask, does this equilibration reflex resemble the geotropism of the roots of plants? It bears a certain resemblance only at one end of the reflex arc. The further fate of the stimulus along the vestibular nerve and the posterior longitudinal fasciculus to the gray matter of the cord and the spinal root cells and thence *via* the anterior roots and motor fibres to the muscle, seems such an extensive addition, that one should hesitate to designate the two reactions by one and the same name. It would be much better to term these righting movements equilibration reflexes, rather than geotropisms. It is a bad thing to lose sight of important distinctions in an attempt at generalization.

Under the term "geotropism" various authors include the tendency of microörganisms to accumulate at upper and lower levels of the water.[5] Thus, *Paramecia* prefer the upper levels and are spoken of as negatively geotropic. Many forms of bacteria prefer the lower levels and are spoken of as positively geotropic. It is rather peculiar that the geotropic reactions of *Para-*

[4] *Sitzungsber. der Wiener Akademie der Wissensh*, 1893, Vol. 102, Abth., 3, p. 149, *Fide* Loeb, *op. cit.*, p. 152.

[5] Cf. E. G. Verworn, *Allgemeine Physiologie*, fifth edition, p. 525.

mecium do not take place if the walls of the containing vessel are not clean, or if the water contains many solid particles in suspension. In such cases the animals may settle against the solid matter on the walls of the tube and remain at any level. The explanation of this fact would throw no little light on the true nature of this reaction. It seems to exclude the explanation of changes of pressure and their resultant effect on the transfusion of materials through the cell walls.

The human race manifests a similar type of reaction. When we ascend above certain altitudes we become dyspnœic, easily fatigued, and suffer from palpitation of the heart. We feel uncomfortable and dissatisfied and descend to a lower level. Are we, therefore, positively geotropic? Not in the sense that geotropism is a forced movement—that above certain altitudes our muscles reflexly assume a tonus that makes downward movement and only downward movement possible. Are we sure that lower organisms move only within limited regions because gravity at certain depths causes forced movements that bring them to other levels?

Jennings thus describes the movements of *Paramecium* in making their depth reaction: "Studying the movements of *Paramecia* at this point, one observes that the forward motion becomes slower, while the spiral course becomes wider. The animals swerve more strongly than usual toward the aboral side, so that the anterior end swings about in a circle. . . . . Thus, the animals are giving the avoiding reaction, 'trying' successively many different positions. This is continued or repeated till after a time they come into a position with anterior end upward. The strong swerving reaction then ceases; the animals swim upward in the usual spiral course."[6]

It is possible and probable that the reason for this reaction is similar to that of geotropism in plant organisms. Lyon has pointed out that *Paramecium* contains substances of different specific gravities. If, then, it directs its anterior end downwards there must be a redistribution of these particles. This produces a stimulus and the animal reacts until this source of irritation

[6] H. S. Jennings, *Behavior of the Lower Organisms*, New York, 1906, p. 76.

is relieved, which occurs only when the anterior end is again directed upwards.[7]

If this theory of the depth reaction of *Paramecium* is correct, there is an analogy of functions between its suspended particles, the starch grains in certain plant cells, and the otoliths of the metazoa. While in plants the effect of the starch grains is direct, changing the tension in certain cells and their metabolism without further apparent accompaniment, in *Paramecium* and the metazoa it seems likely that conditions of stimulation or irritation intervene between the action of gravity on certain particles and the righting reaction. In ourselves we recognize a disturbance of equilibrium by a sensation of peculiar character. It is not unreasonable to suppose, in metazoa with neural mechanism similar to our own, that there may be at times, associated with the righting reaction, conscious states bearing some similarity to our own. Is there anything of this nature in the microscopic *Paramecium?* There is no scientific evidence to rule out this possibility. Its movements, on the contrary, as observed, do not seem to be forced by a greater tonus in the cilia of one side rather than another. It seems rather to react until a source of irritation is removed. That some dim forces of "awareness" should be associated with this irritation is within the realm of possibility.

Heliotropism.—This tropism may be familiarly observed by anyone who places a plant in his window and watches the leaves and the flowers turn towards the light. Its mechanism is only obscurely understood. According to the studies of Haberlandt it seems likely that the structure of the epidermis is such that it can focus the rays of light and thereby cause a difference of illumination in the interior of the leaf. The position of the point of focus would vary with the direction of the source of illumination. His experiments would indicate that highly sensitive plants have a capacity for reacting to differences of light intensity "which is not inferior to that of the human eye."[8]

The epidermis being the receiving organ of this reaction, the light is transmitted by it to the tissues beneath. Here it acts upon

[7] Lyon, E. P., "On the Theory of Geotropism in Paramecium," *American Journal of Physiol.*, XIV, 421–432, *Fide* Jennings.

[8] *Physiological Plant Anatomy*, translated by Drummond, p. 629.

a substance, which is in general absent from the epidermis itself, the chlorophyl, a greenish coloring matter contained in small granular bodies termed chloroplasts. The chloroplasts take up a position which exposes them to a maximum degree of illumination, unless the intensity of light exceeds an optimal maximum. Thus, under mild illumination they may be arranged above the horizontal cell walls—just under the thin layer of epidermis that transmits the daylight. If the light becomes stronger, they may leave the horizontal and arrange themselves along the vertical walls, where they enjoy a certain degree of protection. Under very intense illumination they may clump together in the centre of the cell.

The mechanism which underlies this motility of the chloroplasts is unknown to us. We simply name it when we say that under mild illumination the chloroplasts are positively heliotropic, under strong illumination negatively heliotropic. We likewise are ignorant of the exact mechanism by which certain flowers keep their heads directed toward the sun from morning until evening.

Many unicellular plant forms, many protozoa, and metazoa manifest this tropism. How some of these forms of life move at all is a complete mystery to us. It is not surprising then that we should not understand just why they move to or away from the light.

In the metazoa, heliotropism is sometimes an important element in instinctive activity. Loeb has shown that when the caterpillars of *Porthesia chrysorrhœa* have just left the cocoon in which they wintered they are very strongly positively heliotropic. This, along with a much weaker negative geotropism, forces them to crawl away upward and never downward. The result of this is that they eventually reach the tips of the branches on which they crawl, and there the same warm sun which drew them out of their cocoon has brought forth the first tender buds of the spring. It is in this way that they find their first food with unerring certainty.

Loeb maintains that animal and plant movements are dependent upon light in one and the same way because:

(1) The movements caused by light depend upon the direction of the rays of light in both animals and plants.[9]

(2) The shorter are more effective than the longer wavelengths of light in calling forth heliotropism both in animals and in plants.

(3) The reaction in both is a factor also of the intensity of the rays of light, so that between two lights the tropism is towards the stronger light.

(4) Light causes the orientation of plants and animals only within certain limits of intensity.

(5) Temperature influences the movements of orientation of both plants and animals to light.[10]

With the exception of the cloud of doubt which hangs over the question, whether the intensity or the direction of the rays of light is the determining factor, the similarities maintained by Loeb are well-established facts. Does it, therefore, follow that heliotropism in animals and plants is essentially identical?

A tropism, it should be remembered, is something akin to a reflex action. It consists of a stimulus, a central process or processes, and a response. For real identity all the elements must be the same. To show that the stimulus is the same in both animals and plants does not establish the identity. In his enthusiasm to establish identity Loeb has confined his attention to the stimulus. The central process is very important in considering the true nature of this tropism, but of the nature of the central process we are as yet in ignorance. Until further information is available the question remains open.

In man there is nothing similar to the heliotropism of plant life in the sense that equilibration resembles geotropism. Here the reaction is dependent on consciousness, for a man who is totally

[9] It may be well to note here that botanists and zoologists are not agreed upon the point whether or not heliotropic movements are dependent on the direction of the rays of light, or on the intensity of the illumination. Verworn in his *Allgemeine Physiologie* cites an observation of Oltmanns which would indicate that intensity and not the direction of light is the prime factor. Cf. F. Oltmanns, *Ueber die photometrischen Bewegungen der Pflanzen. Flora.*, Jahrg. 1892.

[10] *Studies in General Physiology*, Chicago, 1905, Part I.

unconscious does not maintain his equilibrium. It is, therefore, remarkably different from the geotropism of plants—not because the acting force is different, but because the central process is not the same. It is very likely that some difference obtains between the central processes in the heliotropism of the metazoa and those involved in the mechanism by which, for example, the leaves of the ivy always maintain one side to the sun and another to the wall.

Chemotropism.—Microörganisms have a tendency to move toward or away from certain chemical substances. This movement, in some cases at least, is due to the fact that a chemical substance diffusing in one region produces a relatively greater or less source of irritation. The response to this source of irritation is an avoiding reaction which results in the organisms accumulating in the region of relative freedom from irritation. Thus, Jennings found that if a drop of .1 per cent. sodium chloride be allowed to diffuse under a slide containing *Paramecia* when the animals come to the zone of diffusion they give their avoiding reaction and swim in another direction. If, however, they are placed to start with in a .5 per cent. solution of sodium chloride, and a drop of .1 per cent. sodium chloride is allowed to diffuse in this solution, the animals on coming to the zone of diffusion pass right through into the drop. On coming to the zone of diffusion at the other side of the drop they here give their avoiding reaction, and swim back again to the other edge where the avoiding reaction is again repeated, and so on. The result of this is that protozoa happening to pass into the drop are caught and held so that it is soon swarming with organisms.

Bacteria are strongly positively chemotropic to oxygen. The leucocytes of the blood are strongly chemotropic to bacteria. The source of this attraction is probably the toxines that are diffused from the bodies of the bacteria. When a nerve is cut the fibres separated from their cell of origin degenerate. The sheaths in which they were placed remain as empty cylinders. When regeneration commences the nerve fibres may pass through several centimetres, even turning around obstacles, to find these empty sheaths—into which they finally grow. The process by which

this is done is supposed to be a chemotropism, its source being the diffusion of the products of degeneration into the surrounding tissues.

It is probably due to chemotropism that the spermatozoön approaches the ovum and adheres to it until it finally penetrates its wall. The growth of tissues, in the embryo, of the nerves to their muscles, of pigment cells to definite localities is probably due to chemotropic influences.

According to Loeb, the orientation of animals towards chemical stimuli is again a question of forced movements: "*The centre of diffusion* takes the place of the *source* of light, and the *lines of diffusion* (that is, the straight lines along which the molecules move from the centre of diffusion into the surrounding medium, *i.e.*, the air) the place of the rays of light. The chemical effect of the diffusing molecules on certain elements of the skin influence the tension of the muscles, as the rays of light influence the tension of the muscles in heliotropic animals.[11] As typical examples he cites the movements of flies towards decaying meat on which they deposit their eggs, and the movements of the larvæ towards substances found in decaying meat and cheese. These animals are bilaterally symmetrical, and it is mainly to such animals, says Loeb, that his theory applies. He has not, however, excluded the possibility of a real sensory guidance due to the sense of smell. There is no positive evidence that his imaginary mechanism really effects the movements of flies toward substances on which they deposit their eggs. It certainly does not account for the movements of *Paramecium* nor of amœba as the observations of Jennings show. The probable explanation of chemotropism is a physiological irritation and attraction to which the organism reacts as a unit. The irritation may be due at times to osmosis; of the physiological nature of the attraction we have at present no mechanical concept.

Thermotropism.—Animals always move away from a region in which temperature conditions are unfavorable to their vital processes. Their positive or negative thermotropism is therefore always relative. Its probable source is a condition of irritation

[11] *Comparative Physiology of the Brain*, New York, 1900, p. 186.

caused by any extreme of temperature whether above or below their physiological zero. The organisms move till they come to a region where this irritation is reduced to a minimum.

Mendelssohn, in studying the tropisms of unicellular organisms, supposed that they gathered at the warmer or cooler end of a trough of water because compelled by forced movements such as Verworn supposes in his theory of tropistic action. If one of these unicellular organisms is swimming with its long axis perpendicular to that of the trough its cilia on one side are cooled, on the other heated. In positive thermotropism the cooled cilia, according to theory, beat more rapidly and the animal turns to the warmer end. In negative thermotropism the warmed cilia are supposed to beat more rapidly and the animal turns to the cooler end.

Jennings by actual observation of the infusoria found that they did nothing of the kind. When they come to a region where the temperature is above or below their optimum, instead of turning in the simple way supposed by the theory of tropisms, they back up and then drive ahead again but always at a different angle and to the side away from the mouth. In this way they eventually turn completely around and swim in the opposite direction.

There is in these organisms no clearly demonstrable simple mechanism that is set in action mechanically by mere differences in temperature in the two sides of the body.

Stereotropism.—This peculiar form of reaction is a tendency of certain animals to bring their bodies into contact with the greatest possible area of solid surroundings. Thus, when you roll over a log in the woods the insects scatter hither and thither. This reaction is not always a negative heliotropism but sometimes a positive stereotropism. For some of these insects will take refuge under a plate of glass as well as under a log. An earthworm placed in an empty tin can will not coil up anywhere, but will move about till its body finds support in the angle formed by the junction of the bottom and wall of the containing vessel.

A mechanical explanation of this tropism in mere terms of inequality of stimulus on the two sides of the body is by no means clearly evident.

Galvanotropism.—This is a type of reaction never met with in nature and the only one to which perhaps Loeb's concept of forced movements applies.

The introduction of the term, according to Loeb, was due to J. Miller-Hettlingen, who found, while working in Hermann's laboratory, that if the seedlings of *Vicia faba* are exposed to a constant current the tips of the roots bend back to the cathode. Hermann discovered shortly after that tadpoles placed in a trough through which a constant current is passing turn their heads to the anode. (Loeb was unable to confirm this.)[12]

Blasius and Schweizer found[13] that many animals when placed in a trough of water through which a current is passing manifest their tendency to go to the anode. They suppose that the animals assumed the position that caused them the least pain. On careful examination Loeb and Maxwell found the following interesting condition in the crustacean *Palæmontes:* "When the animal is subjected to a constant current in a trough of water its limbs are forced to assume such positions that it can move most easily to the anode—but with difficulty in any other direction."[14]

This quotation gives us an idea of a forced orientation toward a given stimulus. It is this concept which lies at the basis of Verworn's and Loeb's mechanical theory of tropisms in general. According to the mechanical theory, not only the galvanic current but all the modes of energy to which organisms react, stimulate symmetrical points of the body surface, which stimulation, being transmitted by the central nervous system, produces a difference in muscular tonus on two sides of the body. This difference in tonus forces them to go toward or away from the point of stimulation in a purely mechanical manner. Another example of forced movements in the electric current is found in *Paramecia.* When they are subjected to a galvanic current they move

[12] Cf. Loeb, *The Dynamics of Living Matter*, 1906, p. 145.

[13] *Pflüger's Archiv.*, 1893, Vol. 53, p. 493, *Fide* Loeb.

[14] Quoted from Loeb, *Comparative Physiology of the Brain*, pp. 164–166. See also Loeb and Maxwell, "Zur Theorie des Galvanotropismus," *Pflüger's Archiv.*, 1896, Vol. LXVIII.

promptly to the cathode. Reverse the current, and they move with machine-like regularity to the new negative pole. Examining these infusoria under such conditions one finds that they are really attempting to swim in two directions at once, the anterior cilia pointing to the cathode, and the posterior to the anode. The point at which the reversal of the cilia takes place varies with the strength of the current. With a certain intensity of current the animals no longer progress in any one direction but swing about in an incoördinate fashion. With strong currents they move backwards to the anode.[15]

In no other type of stimulus do we observe reactions that are in any way similar. If, however, *all* stimuli produced their tropisms in this fashion we should be able to detect some indications of a change in tonus in the locomotor organs of the reacting organism.

Bancroft[16] criticized this argument of Jennings and pointed out that *Euglena* reacts to the electric current in the same way that it reacts to light. "It is evident," he says, "from this account, that the details of the galvanotropic orientation are identical with the heliotropic orientation as described by Mast, and which I can confirm. *Euglena* has no more direct way of orienting than that employed in heliotropism. Jennings' contrast between heliotropic and galvanotropic orientation will not hold for this organism." (Pp. 413-414.) But to defend Loeb's position one must show that *all* tropisms take place by the constrained movements that one observes in *galvanotropism* with the organs of locomotion forced to take up different positions in accordance with the direction of the current. What is needed is evidence that in heliotropism, and in all other tropisms, as well as in galvanotropism, a difference in tonus in the organs of locomotion exists and varies with the direction of the source of stimulation. To point out a galvanotropism which resembles heliotropism, but in which no differential tonus is observed, does not help Loeb's theory in the slightest.

[15] Cf. Jennings' *Behavior of the Lower Organisms*, 1906, p. 83 ff.

[16] "Heliotropism, Differential Sensibility, and Galvanotropism in Euglena," *Journal of Experimental Zoology*, 1913, XV, pp. 383-428.

Until this differential muscular tonus can be actually seen in the other tropisms we can only say that scientific observation has not confirmed Loeb's ingenious speculations. It indicates, on the contrary, that tropisms take place because organisms react as individuals to conditions of irritation and sources of attraction, until the irritation is removed or the object which attracts is attained. Irritation and attraction are to be understood in a physiological and not a psychological sense. It is not, however, possible to deny with certainty all psychological accompaniment to these physiological conditions. In fact, in many cases, especially in the metazoa, arguments of analogy lead us to postulate the probable existence of psychological elements actually entering as causal factors in the tropistic mechanism.

Tropisms and Chemical Reactions.—Loeb argues that the "animal will" may be expressed in terms of photochemical reactions because both follow one and the same law—namely, the law of Bunsen and Roscoe—that the photochemical effect of light equals the product of the intensity of the light times the duration of the illumination. He measured the time it takes for 50 per cent. of a number of young regenerating polyps of *Eudendrium* to turn to the source of illumination with various intensities of light. He found a rough agreement between the observed times and those calculated by the Bunsen-Roscoe law. Blaauw showed the same law to hold for the heliotropic curvatures of the seedlings of *Avena sativa.* Loeb then argues as follows: "It is, therefore, obvious that blind instinct which forces animals to go to the light, *e.g.,* in the case of the moth, is identical with the instinct which makes a plant bend to the light and is a special case of the same law of Bunsen and Roscoe which also explains the photochemical effects in inanimate nature; or in other words, the will or tendency of an animal to move towards the light can be expressed in terms of the Bunsen-Roscoe law of photochemical reactions."[17]

A consideration of the evidence on which this conclusion is based raises an interesting problem in scientific logic.

[17] Loeb, *The Organism as a Whole.*

Loeb started out with an experimental principle. All photochemical reactions obey a certain law. He then uses this principle as a criterion to find out whether or not certain other things are also photochemical reactions. And here he slips into a logical fallacy, for the use of this principle as a criterion to find out whether or not other things which obey the same law are photochemical reactions, implies a simple conversion of a universal affirmative proposition.

If one can say, all things that obey law X are photochemical reactions, then all we have to do is to ascertain by appropriate experiments the fact of conformity to law X in order to show that the thing that conforms is a photochemical reaction. But this is not the starting point of Loeb's argument, but the converse, *viz.*, all photochemical reactions obey law X. But, granted that *all* photochemical reactions obey law X, it does not follow that everything that obeys law X is a photochemical reaction. All men are animals gives us no warrant for saying that every animal is a man. All chemical compounds are by weight constant multiples of the units that compose them; but all things which are constant multiples by weight of the units that compose them are not chemical compounds.

There is only one case in which a universal affirmative proposition may be simply converted, and that is where the proposition is a definition so correctly expressing the nature or a property of the thing defined that the predicate agrees to this thing and this thing only. Thus the classic definition, all men are rational animals, may be simply converted to all rational animals are men.

A definition which does not express genus and specific difference, or a property which belongs exclusively to the thing defined, cannot be simply converted. Thus, one might describe gravity as a force whose intensity varies inversely as the square of the distance. One would not be justified in using this as a general criterion for detecting the force of gravity by simply converting it, and saying that every force whose intensity varies inversely as the square of the distance, is identical with the force of gravity. For the intensity of light varies inversely with the square of distance, and it is not clear without any

other evidence that there is no difference between the two forces. Modern physics may show relationship between the two or perhaps even identity; but the proof of this identity will demand something more than the logically fallacious method of Loeb.

What, then, are we to say of the identity of the "animal will" with a photochemical reaction? That the conclusion based on agreement with the law of Bunsen and Roscoe is premature and rests on a logical fallacy—to say nothing of a lack of analysis of the concept of the "animal will."

The fact, however, that heliotropism in plants and in some animals seems to follow the law of photochemical reactions is a valuable piece of information. Analogy suggests the possibility and even the probability that a photochemical reaction is one element in the chain of events which constitute the tropism. The following up of such analogies is the surest road to scientific discovery. But hasty generalizations built upon them lead usually to nothing but error and confusion.

Tropisms in Human Life.—The rôle played by tropisms in human life is very limited. They are reactions by which organisms orientate themselves toward simple physical stimuli. In the general sense here given they do play a limited rôle in our life. In the strict sense of Loeb—that of forced movements to or from the source of stimulation—they are utterly unknown in human experience. Simple physical stimuli do, however, act upon us agreeably or disagreeably, and we avoid them or seek them without thinking or perhaps with deliberate intent and forethought. We do not have, however, any pronounced tendency to place our bodies in such a position that these stimuli act upon symmetrical areas. An example of such an orientation is perhaps human thermotropism to a fire. When a man goes to a fire to get warm he stands first with his face to the fire. If the front part of his body gets too warm, he faces full about and puts his back to the fire. He does not go to the fire and put first one side of his body and then the other towards the blaze; but he has a definite tendency to face the source of heat symmetrically. The probable reason for this is the fact that in man the anterior and posterior surfaces are larger than the lateral, and, consequently,

absorb more heat. There is no question of any forced movement. The orientation seems rather to depend on a maximum feeling of satisfaction.

Physical stimuli, such as heat and light, are regarded as fundamental requirements of modern life, not as ends in themselves, but as conditions for the enjoyment of other interests. They thus slip into the background. Human kinetic activity is not directed by such things; but rather by instinctive cravings and intellectual pursuits with which light, heat, and electricity as such have little or nothing to do.

PART III
HUMAN EMOTIONAL LIFE

CHAPTER I

THE AFFECTIVE MENTAL STATES

To ordinary unskilled interpretation there is a very clear distinction between our sensations and our ideas, on the one hand, and such states as we term feelings or sentiments, on the other hand. In the history of psychology there has been a great deal of discussion about the nature and validity of this distinction. The opinions have varied from a denial of the distinction altogether up to the assertion of absolute independence for both classes of phenomena. It might be well to subdivide our discussion of the various problems which arise in the study of the affective mental states into certain headings, pointing out as we go along the names and the historical interest attaching to each problem that thereby arises.

I. In the first place, we may ask: *Are there really any affective mental states at all?* The Stoics were perhaps the first who denied the existence of the feelings and emotions as something distinct from the representative mental processes. The Stoic definitions of emotions are all in terms of intellectual judgments, and allow no room for a mental state distinct from the representative processes. Against this view may be urged, in the first place, the fact of introspection that, for instance, anger is not only an awareness of the fact that someone has done me an injury, but is a specific reaction over and above this intellectual judgment. In fact, we may say that the mind receives impressions and reacts to the perceptions that it receives. The reception of impressions results in some kind of a mental copy or representation of the object. This mental copy or representation is the more or less complex group of sensations and images and concepts which are aroused and united into one organic unit—the perception of the object. Besides this passive reception the mind reacts to this perception in a definite way. It finds the reception, at times at least, agreeable or disagreeable. It accepts or rejects it with a display of mental phenomena which are distinct from the re-

ception itself or mere intellectual judgment based upon this distinction. This display of mental phenomena is the group of affective mental processes. There is one peculiar characteristic of the affective mental states which distinguishes them very sharply from the representative mental states. This is the fact that the representative mental states may be very easily attended to as such; that attention to them brings them out all the more clearly and seems almost to increase their intensity. Attention, however, to an emotion or a feeling is scarcely possible. We may think of the cause of the emotion or of the feeling and thereby increase its intensity, but if we try to look at the emotion itself to, let us say, its peculiar pleasurable quality as distinct from the sensation, or try to analyze an emotion of anger in the midst of our rage, immediately the emotion dwindles and slips into the background of consciousness. The affective mental states cannot be attended to in the same way as the representative processes. We are, therefore, justified in distinguishing these two classes of phenomena. This distinction points out to us the fact that in the interaction between the mind and its environment the mind receives impressions and reacts to them by peculiar characteristic processes with more or less bodily resonance accompanying them. The receptions of mind are the representative processes. The reactions of mind are, in part at least, the affective mental states.

II. *Are there two distinct forms of the affective mental states, one that we may term sensory feelings and the other that we may term emotions?* A splitting up of the affective mental processes into two groups came very early in the history of modern psychology as a logical result of certain principles of the Herbartian psychology. Strange to say, this distinction arose from certain metaphysical principles. According to the Herbartians, we have many ideas. These ideas are known to us only as conditions. There must, therefore, be something which is conditioned by them, that is to say, they must have some underlying substrate. Furthermore, in every moment of self-observation we experience the fact of its unity, for all our ideas are referred to one unit of self-observation and not many. There is always one and the

same perceiving ego from moment to moment as well as in the present moment. Consequently, according to the Herbartians, there is one substrate of all our mental processes—the one simple mind or soul. The soul does not produce its own ideas, therefore other simple beings must exist that act upon the soul and cause its states of consciousness. Besides the states of consciousness which arise from external influences there are others which are produced by the interaction of conscious processes. This gives rise to two sets of conscious processes, one resulting from the *interaction between body and mind.* These are sensations and sensations alone. They are the primitive conscious processes. The other set arises from the *interaction between mental processes.* These are the feelings or derived conscious processes.

It is evident, however, that many of our feelings come to us with the sensations themselves. They seem to be produced by the interaction between body and mind. The Herbartians were forced, therefore, to postulate a group of feelings distinct from their derived conscious processes, and this they did by recognizing sensations with a tone of feeling. They denied, however, that this tone of feeling was a genuine feeling since it did not arise from the interaction of ideas. It is, according to them, the inhibition or the stimulation of the organic activity of a living being. If it inhibits organic activity it is *unpleasant.* If it supports it or stimulates it, it is pleasant. Much more recently Stumpf[1] maintained that "the sensory feelings are as a matter of fact nothing more nor less than sensations. They are a class of sensations which, perhaps, like every other class of sensations has its own specific peculiarities but which in all other essential characteristics and modes of behavior conducts itself like the other forms of sensations."

Wundt's tridimensional theory of feeling distinguishes between the simple feelings and the complex emotions; although in the earlier editions of his psychology he maintained that feeling was a tone of sensation just as intensity and quality are tones or attributes of sensation.

[1] "Ueber Gefühlsempfindungen," *Zeitschrift für Psychol. und Physiol. der Sinnesorgane*, 1907, XLIV, pp. 1-49.

According to his later theory, subjective analysis points out three classes of simple feelings, one class embracing what we ordinarily recognize as pleasure and pain. Thus tastes are agreeable or disagreeable; colors are pleasant or unpleasant, etc. The second class is what he terms excitement or restfulness (or depression). As an example of simple sensory excitement and restfulness, he points to the characteristic feeling that we have with the presentation of red and blue. A bright red would give an altogether different feeling to the observer than would a navy blue. This feeling would not be the sensation itself of redness or blueness, but something over and above the sensory characteristics. The effect of red on the bull is proverbial though called in question recently by Stratton.[2] In recent times it has been recognized that color affects the emotional states of depressed patients, and so in insane asylums we sometimes have red rooms and blue rooms. A third class consists of feelings of tension and relaxation. To experience an example of this in its simple sensory form one need but listen to the beats of a slowly moving metronome or to a clock that is beating seconds. As one waits for the tick to occur one experiences just before the moment of its occurrence a peculiar feeling of tension. After one hears the tick there is a slight feeling of relaxation. An example of all these feelings, along with much more complicated processes, might be taken from a game of baseball. Suppose a game tied in the twelfth inning with the bases full and two men out. A batter comes to the plate and drives out a fly which seems to be going way beyond the outermost fielder. Immediately there is a tremendous excitement for everybody and a high degree of pleasure on the side of the batter, but as they notice the fielder turn around and run there arises everywhere and becomes dominant a very marked degree of tension. This is something different from the excitement. When the fielder turns around, jumps into the air and catches the ball with one hand, the tension at once disappears, the critical moment is passed, there is the wildest excitement, but along with it there is a distinct feeling of relaxation, on the batter's side especially, for the crisis has passed. There is deep

[2] "Red and the Anger of Cattle," *Psychol. Rev.*, 1923, XXX, 321–325.

regret on his side, but intense joy on the other. Thus, we can see the distinction between these various forms of sensory feelings in a practical example.

Wundt maintains that no other simple feelings beside these can be found, and that all other feelings can be analyzed into them. All three relate to mental states. None of them can be localized like sensations nor can their objects be pointed out. Unlike sensations also, they are independent of any sense organ or any kind of stimulus. At the same time they have the fundamental attributes of quality and intensity, and they have a characteristic peculiarity in their intensity, each group has two extremes of intensity; each extreme shades over to the other through a zero point of indifference.

The simple feelings, according to Wundt, give rise to complex feelings by fusing and producing resultant feelings. These resultant feelings may fuse and produce resultants of a higher order, and these fuse, producing resultants of a still higher order, etc. One of the simplest of resultant feelings, according to Wundt, is the feeling of well-being. This comes from pleasurable feelings and the lack of all unpleasant ones arising from conditions of the organism.

Each emotion to which we have given a specific name, as joy, anger, etc., may be analyzed into curves of three dimensions, just as in analytical geometry we might analyze a tridimensional curve into three simple components. Thus, according to Wundt, there are two classes of affective states; one is simple and the other complex.

No one will be inclined to doubt the distinction between simple sensory feelings and the complex emotional processes. The question arises, however, how many simple feelings we have. Wundt recognizes that every resultant feeling has its own specific tone proper to the complex. There is no evidence which shows us conclusively that this specific tone (for instance, the tone of impatience in the emotion of anger, the peculiar delight in the emotion of joy) is a *resultant* feeling. It is a pretty theory to assume that it arises by the fusion of these simple feelings, but, for all we know, it may itself be a simple feeling. Can

we analyze, for instance, the characteristic tone of feeling that one experiences in slight impatience into any simpler components? Is it something different from unpleasantness? It seems *sui generis*. It may be accompanied by unpleasantness, but at times, under different circumstances, one may experience the same unpleasantness but no feeling of impatience. Wundt's theory merely raises the question: How many simple feelings do we experience? He names six. He points out furthermore, according to his own interpretation, that there is a specific tone of feeling to every resultant feeling. Perhaps all of these specific tones are themselves simple feelings. The writer is inclined to believe that they are. There is no satisfactory classification for them as yet, just as there is no satisfactory classification of odors into definite groups. Our emotional life has a complexity of qualities similar in extent to the number of characteristic nuances that we recognize in sensations of smell.

To sum up, we may say that we have a number of "simple" feelings. The exact number of these simple feelings is unknown. Pleasantness and unpleasantness are the simple feelings most commonly recognized. Tension and relaxation, excitement and depression as described by Wundt are also, in all probability, true feelings and not mere complexes of sensation. But besides these there may be many others. Impatience, for example, seems to be a specific elementary feeling. There are, perhaps, as many simple feelings as there are emotions. The emotion itself is a complex of its specific quality plus ideas, sensations and impulses. The question proposed in this section, therefore, is to be answered thus. There are two elementary forms of affective states, feelings and emotions. Emotions differ from feelings in that an emotion is: (1) Accompanied by a much more complex and extensive bodily resonance; (2) an emotion is a reaction to an intellectual insight and not to a mere sensation.

We shall see below that emotions are reactions to intellectual insights. The specific feeling of an emotion, therefore, is not a reaction to the sensations of perception, but to the meaning of a perception. There are some simple feelings which are reactions, not to meanings but to mere sensations, *e.g.*, pleasure and pain.

It is possible, therefore, to subdivide the affective mental states into two classes, (a) affections that arise in response to mere sensations, (b) affections that arise in response to meaning.

III. *Are the affective mental states attributes of sensation and not independent forms of mental life?* The attribute or tone theory was propounded by Wundt in the first editions of his psychology. Lehmann traces it back to Kant, quoting the sentence, "The subjective element in an idea which can in no manner become a piece of knowledge, is the pleasure or pain that is united with it."[3] Kant, therefore, according to Lehmann, maintains that feelings are:

(1) Intimately united with ideas, and

(2) Contrasted with them inasmuch as they cannot be considered knowledge.

According to Lehmann:[4]

(1) "A pure emotional state does not exist. Pleasure and pain are always united with intellectual states."

(2) "By the emotional elements or tones of feeling we understand the psychological abstractions, pleasure and pain, conceived of as isolated from the intellectual states and characterized by their opposition to them."

(3) "By feelings we understand the real psychological states which contain both intellectual and emotional elements."

There are, according to Lehmann, only two emotional elements, pleasure and pain. In all emotions one or both of these elements are present. One emotion, therefore, is distinguished from another not by its affective components but by its representative elements. This was once and perhaps still is the most widely accepted of psychological theories of the emotions. Against this view the following considerations may be urged:

i. Feeling cannot be an attribute of sensation because it has itself the main attributes of sensation. It has, for instance, its own specific quality, its own degree of intensity, and its own duration. No attribute of sensation has these characteristics as

[3] Cites *Kritik der Urteilskraft*, Kirschmann's edition, p. 28.

[4] *Die Hauptgesetze des menschlichen Gefühlsleben*, Leipzig, 1892, pp. 16–17.

distinct from the sensation itself. Thus, no intensity of sensation has an intensity, a quality, and duration of its own.

ii. If any of the attributes of sensation are reduced to zero, the sensation itself is zero, but a sensation may lose entirely its feeling tone without disappearing.

iii. All the attributes of a sensation have their counterpart in the stimulus. Thus, the intensity of a sensation of sound has its counterpart in the amplitude of the vibrations in the air by which it is produced. The pitch or quality of the tone has its counterpart in the number of vibrations per second, the duration of the sensation its counterpart in the length of time that the sounding body vibrates. Pleasure and pain, however, have no counterpart in the sensation. Thus, while all the recognized attributes of sensation have definite objective references, pleasure and pain have no objective references but an altogether subjective character. They are not, therefore, attributes of sensation.

IV. *Are the affective mental states sensations?* This theory, as we have seen, is maintained by Stumpf for a group of feelings that are at least intimately connected with sensations. Others have gone so far as to maintain that all affective mental states are nothing more than sensations. Something akin to this is implied in the Lange-James position, to be criticised later, which holds that emotions consist in the perception of the sensations that constitute the bodily resonance.

Against the view that affective states are a specific form of sensations we may urge the following considerations:

(1) All other known sensations (except the supposed "sensation" of feeling) have their sense organs. There is no sense organ for pleasure and pain. A sensation without a sense organ seems something of a chimerical assumption.

(2) Not only have pleasure and pain no sense organ, but they may be produced by the stimulation of any sense organ. But, sensations are specific. We are not justified in supposing the existence of a peculiar sensation so general in its characteristics that it may arise from the stimulation of any sense organ whatsoever.

(3) A sensation is produced directly by the external stimulus. A feeling, however, seems to be more indirectly produced by a conscious state on account of which one is affected in one way or another. It is our reaction to this conscious state or reaction to a sensation and not the sensation itself.

(4) Sensations may be localized. Feelings as such cannot be. I may indeed have a painful sensation. This sensation may be localized, but I cannot say that my displeasure at the sensation is localized.

(5) Feelings are subjective; sensations objective. Thus, in knowing we distinguish the subject who knows and the object which is known. In feeling, however, we cannot make such a distinction because there is no object of knowledge. Thus, I can say of a sensation that I see the bright blue sky, but I cannot say, "I am the bright blue sky." On the other hand I say, "I am happy; I am sad, or I am angry," etc.[5]

V. *To what extent do representative mental processes enter into the complexes of feeling that we term emotions?* In our strong emotions of joy, of anger, etc., there is present something more than the mere sensation that gives rise to it. Thus, if one is slapped in the face, the painful sensation may be disagreeable and give rise therefore to a simple feeling of unpleasantness, but this in itself is not enough to produce anger. For instance, in play one might be slapped in the face, and there would be no anger whatsoever, but if a man slaps one as an expression of contempt, it produces an entirely different emotional state. This emotional state is dependent upon an insight into the situation and knowledge of an external individual and his relationships to the one who experiences the emotion. Such an insight transcends completely the qualities of sense. It is an intellectual something and not sensory. So, also, with all our emotions. They are insights and memories of a very complex nature which lie at the root of the emotion and which rise and fall in consciousness during the emotional outbreak, giving rise to renewed intensity by their repeated occurrence. In his book,

[5] Cf. Very excellent treatment of feeling in Fröbes, J., *Lehrbuch der experimentellen Psychologie.*

Das Gemüth, Jungmann has brought out very clearly this element in the emotional complexity by the following example:

"As the prince of the Apostles denied his Master for the third time on the night of His passion—the cock crowed. And the Lord turned around and looked at Peter. And Peter remembered the word that the Lord had spoken to him, 'Before the cock crows thou wilt deny Me thrice.' And he went out and wept bitterly! In this case what was the object of the activity of the intellect that was followed by the emotion—the pain of the Apostle's remorse? The Evangelist has indicated it clearly enough. Peter remembered the word that the Lord had spoken to him. He thought of his Master and the happy days he had spent at His side—of the words of salvation that he had heard from His mouth, of the sublime graces he had received from Him. Those last hours came up before his mind which belonged to this very night of his own infidelity and cowardice—those hours of tender farewell, of the divine love, of the incomprehensible condescension, of the first unbloody sacrifice of the New Testament, of the trembling and the agony of approaching death and the bloody sweat. And when over against all this he held up his thrice-repeated sin, he felt deep down in his heart how unworthily he had acted, because he had been ashamed of his Master and his God, because he had been false to the fidelity he had sworn and had torn asunder the bond of his friendship and his love. These were the thoughts that filled his soul with so much bitterness. This was the evil, the idea of which sunk his soul in a sea of burning pain. These were the goods on account of whose loss the tears of remorse streamed from his eyes. That such thoughts the reasoning soul alone is capable of thinking, that of such goods sense has no intimation, that such an evil would not worry the lower self, all that certainly needs no proof."[6]

Jungmann defines an emotion as "a simultaneous activity of both appetitive faculties—the higher and the lower—called forth by the actual knowledge of a good or evil, which as such reason alone can understand."[7]

[6] Jungmann, Joseph, *Das Gemüth,* Freiburg, 1885, pp. 88–89.

[7] Jungmann, Joseph, *Das Gemüth,* Freiburg, 1885, p. 92.

The presence of an intellectual element as the cause of an emotion over and above the sensation seems to be a necessary postulate. If this is so, animals probably have no emotions in the sense in which emotion applies to human affective reactions, for it appears from the data of animal psychology that dogs, cats, rats, etc., have no intellectual appreciation of the problems they are given to solve, but learn them by the development of habits of reaction without insight. Human emotion has as its cause and its root an intellectual insight. It is not, therefore, merely dependent upon sensation.

VI. *Is the bodily resonance the cause or the effect of the emotion?* By bodily resonance is here understood the many phenomena which go to make up what is usually termed the expression of the emotion. That is to say, the activity of the facial muscles, the changes in the rate of heart-beat and of its intensity, the changes in respiration, the visceral effects, the glandular secretions, such as the beads of perspiration, or the paralysis of secretions, such as the dry throat, etc. These phenomena constitute bodily resonance. From the days of Aristotle, through medieval philosophy, down almost to the present, these phenomena have been looked upon as the effects of the emotion and not its cause—as the emotional expression and not its constituent elements. In the nineteenth century two men at approximately the same time put forward the view that the ordinary interpretation of the situation is just the reverse of what it should be—that a perception produces a bodily resonance and this bodily resonance produces the emotion, or rather that the perception of the bodily resonance *is* the emotion. According to the traditional view, the perception *produces* the emotion and the emotion *produces* a bodily resonance. The new theory is named after the two men who first propounded it and is therefore termed the Lange-James theory of the emotions. James states the theory as follows:

"Our natural way of thinking about these coarser emotions is that the mental perception of some fact excites mental affection called the emotion, and that this latter state of mind gives rise to the bodily expression. My theory, on the contrary, is

that *the bodily changes follow directly the perception of the exciting fact, and that our feeling of the same changes as they occur,* is *the emotion.*" [8]

According to this view, therefore, it is more true to say that we are afraid because our hair stands on end rather than our hair stands on end because we are afraid; that we are sorry because we cry rather than we cry because we are sorry. To put the matter in James' own words:

"Common sense says, we lose our fortune, we are sorry and weep; we meet a bear, are frightened and run; we are insulted by a rival, are angry and strike. The hypothesis here to be defended says that this order of sequence is incorrect, that the one mental state is not immediately induced by the other, that the bodily manifestations must first be interposed between, and that the more rational statement is that we feel sorry because we cry, angry because we strike, afraid because we tremble; and not that we cry, strike, or tremble because we are sorry, angry, or fearful, as the case may be. Without the bodily states following on the perception, the latter could be purely cognitive in form, pale, colorless, destitute of emotional warmth. We might then see the bear and judge it best to run, receive the insult and deem it right to strike, but we should not actually feel afraid or angry.

"Stated in this crude way, the hypothesis is pretty sure to meet with immediate disbelief. And yet neither many nor far-fetched considerations are required to mitigate its paradoxical character, and possibly to produce conviction of its truth." [9]

James' proof of his theory is developed in an argument which may be summed up in three fundamental statements:

(1) "*Objects do excite bodily changes . . . so indefinite, numerous, and subtle that the entire organism may be called a sounding board which every change of consciousness, however slight, may make reverberate.*" [10]

This statement is proved by the citation of numerous examples of the bodily resonance.

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[8] James, William, *Psychology* (Briefer Course), 1907, p. 375.

[9] James, William, *Psychology* (Briefer Course), 1907, pp. 375–376.

[10] *Principles of Psychology,* Vol. II, Ch. xxxv, p. 450.

In order, however, to prove the Lange-James theory, it is not sufficient to cite the fact of bodily resonance, but it is necessary to show its position in the temporal sequence of perception, resonance, and emotion. Does the emotion commence prior to the bodily resonance or is it perceived only at the time the subject perceives the bodily resonance or somewhat afterward? The *effect* cannot precede its *cause* in a temporal sequence of events. The all-important matter in deciding between the traditional and the new theory is precisely this temporal sequence. No massing of citations which refer only to the fact of bodily resonance suffices to clear up the problem of temporal sequence.

(2) *"Every one of the bodily changes whatsoever it be is felt, acutely or obscurely, the moment it occurs."*

James proves this by an appeal to introspection. Here again the fact is common property. According to the traditional view as well as the Lange-James theory, the bodily resonance is perceived. There is no dispute about the perception of the bodily resonance. Everybody admits this. What we want to find out is whether or not the perception of the bodily resonance causes the emotion or the emotion causes the bodily resonance which is then perceived as a further element in the affective complex.

(3) *"If we fancy some strong emotion and then try to abstract, from our consciousness of it, all the feelings of its bodily symptoms, we have nothing left behind."*

This James proves by an appeal to introspection:

"What kind of an emotion of fear would be left if the feeling neither of quickened heart-beats nor of shallow breathing, neither of trembling lips nor of weakened limbs, neither of goose-flesh nor of visceral stirrings, were present, it is quite impossible for me to think. Can one fancy the state of rage and picture no ebullition in the chest, no flushing of the face, no dilation of the nostrils, no clenching of the teeth, no impulse to vigorous action, but in their stead limp muscles, calm breathing, and a placid face? The present writer, for one, certainly cannot. The rage is as completely evaporated as the sensation of its so-called manifestations, and the only thing that can be supposed to take its place is some cold-blooded and dispassionate judicial sentence, confined

entirely to the intellectual realm, to the effect that a certain person or persons merit chastisement for their sins. In like manner of grief, what would it be without its tears, its sobs, its suffocation of the heart, its pang in the breast-bone? A feelingless cognition that certain circumstances are deplorable, and nothing more. Every passion in turn tells the same story. A disembodied human emotion is a sheer nonenity.''[11]

It is quite true that we cannot imagine an emotion without its bodily expression any more than we can imagine ourselves standing by a hot fire without getting warm. And still, when we stand by a hot fire, the fire is the cause of our warmth and not our warmth the cause of the fire. We cannot imagine a cause operating without producing its effect. If we attempt to rid our imagination of the picture of the effect we spirit away the cause. James has simply pointed out in this stage of his argument that there is a causal relation between the emotion and its resonance. Everybody admits this. The question is which is cause and which is effect. James' argument does not help us to decide the point at issue. For even though I cannot imagine an emotion without its bodily expression, this does not prove that the emotion is the result of the bodily expression. For the reason why I cannot imagine myself in a great rage without certain bodily disturbances is that I cannot imagine a cause acting without producing its effect.

James maintains that there has been no experimental test of his theory. This would require, he says, a patient who would be absolutely anæsthetic inside and out. He knew of only three such cases. In two, he said, there were no data as to the emotional states. The third, he said, seemed to have manifested some emotion. This he explains by the supposition that this patient's emotional expressions may have been accompanied by a cold heart. It might be interesting, therefore, to examine what we know about the expression of the emotions in the light of the Lange-James theory.

Are the emotions produced by the perception of the bodily resonance or is the bodily resonance the effect of an emotional

[11] James, William, *Psychology* (Briefer Course), 1907, pp. 379–380.

state? In the chapter that follows, we shall consider individually the various types of emotional expression, and we shall ask ourselves whether or not any one of these forms can possibly constitute the main element in the emotion. It is practically impossible to find a living human subject who is completely anæsthetic both inside and out, as James admits, for the test of his theory. Such a patient, were the condition cerebral, would have to have a lesion completely separating the cortex from the subcortical ganglia. Such a patient would probably not live, and if he did live, he would be unable to tell us anything about his emotions. Were the lesion lower down, it would have to be multiple and involve all the sensory cranial nerves, both cervical sympathetics, both vagi, as well as a cord lesion involving a complete sensory interruption. This would have to be below the origin of the phrenics in order that respiration might be maintained. A patient suffering from such multiple lesions would probably not live, and if he did, it is not likely that his vocal apparatus would be left intact and that his intelligence would remain unimpaired to give us a reliable account of his emotional states. It is very likely that most cases which have been reported of complete external and internal anæsthesia are not organic but of an hysterical nature. From an hysterical patient we might learn anything that our theory of emotions would suggest. Cases such as those reported by M. d'Allonnes[12] are evidently of an hysterical nature. The woman he speaks of complained of being unable to feel either good or evil, content or regret. She said that she was "just like a dressed-up broomstick." His account of the case and the physical examination indicate an hysterical condition rather than an organic lesion. Only an organic loss of sensibility would suffice to test the Lange-James theory, because if one found a functional loss of sensibility and there accompanied it a loss of emotions, this also might be functional and due not to the loss of sensibility but to the factors which lay at the basis of the hysteria.

[12] d'Allonnes, R. G., "Rôle des sensations internes dans les émotions et dans la perception de la durée," *Revue philosophique*, 1905, IX, pp. 592-623.

CHAPTER II

THE EXPRESSION OF THE EMOTIONS

I. Facial Expression.—One of the most characteristic expressions of emotion is afforded by the play of the facial musculature.[1]

In 1807, Moreau (*Traité de physionomie*) divided emotions into convulsive, oppressive, and expansive. Convulsive emotions were supposed to cause a general action of all the muscles of the face; the oppressive emotions cause a loss of tonus in the muscles of the face and therefore a lengthening of the face such as we see in the depressions. The expansive emotions, according to Moreau, produced an increase of tonus in the facial muscles and therefore a widening of the face, as in joy, pleasure.

In 1844, Charles Bell, in his *Anatomy and Philosophy of Expression,* put forward the view that the activity of the facial muscles is intimately connected with the action of the heart and lungs. The mouth and nose are organs of respiration. Respiration affects the movements of the mouth and the nose as well as the circulation. The circulation in turn affects respiration. Through the interplay of respiratory and circulatory functions the facial muscles are thrown into the activity of emotional expression.

In 1862, Duchenne of Boulogne published his *Mechanisme de la physionomie humaine.* This classical work put forward the view that each emotion has its typical expression. This expression is brought about by the activity of one or at most a few facial muscles. This view is demonstrated by photographs of facial expressions that were caused solely by electrical stimulation of the muscles involved. His subject was an elderly man who had lost pain sensibility in the face. The skin of the face could, therefore, be stimulated by a faradic current without causing

[1] For a history of the theories of physiognomy, cf. Audibert, A. C. M., "Etude sur la physionomie," *Thèse Bordeaux,* 1892-3, No. 26, p. 120.

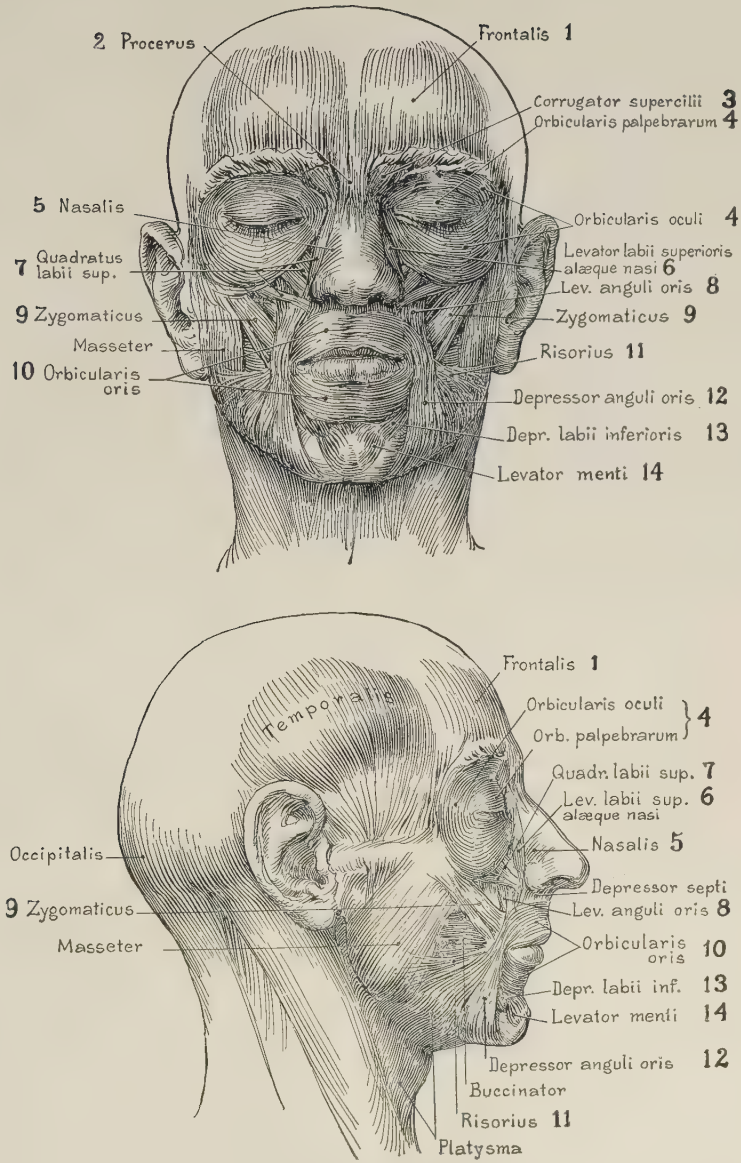


FIG. 3.—MUSCLES OF EXPRESSION.

pain. It was, therefore, possible to stimulate his facial muscles without any tendency to cloud the effect by the expression of pain due to the stimulation itself. Anyone who has examined the photographs that Duchenne has given will recognize what excellent imitations they are of real emotional expressions. Thus, he found that the muscle of attention is the frontalis; the muscle of reflection, the orbicularis oculi (superior portion); the muscle of pain, the corrugator supercilii; the muscle of aggression, the pyramidalis nasi; the muscle of lasciviousness, the transversalis nasi; the muscle of joy and benevolence, the inferior portion of the orbicularis oculi and the zygomaticus major, etc.

According to Duchenne, stimulation of the nerve trunk of the facialis can cause only a grimace and not an emotional expression. To obtain the emotional expression, one must stimulate definite muscles or groups of muscles at their points of election. If this is the case, and it seems likely that it is, the emotional expression must be elaborated somewhere within the encephalon.

G. Dumas[2] attempted to show that any light stimulation of the facial nerve would cause a smile. He gives three photographs of the results obtained. Two of these would seem rather to bear out the view of Duchenne that stimulation of the facial nerve produces a grimace, but not an emotional expression. In only one of the photographs does the expression resemble a smile, and this he admits was the best he was able to obtain. The smile in this case is a sickly smile, lacking in the smile of the eyes. Duchenne pointed this out as characteristic of the artificial or society smile. Anyone can raise the corners of his lips when he pleases, but he cannot when he pleases produce the merry twinkle of the eyes which is caused by the contraction of the orbicularis oculi. It would seem, therefore, that Dumas' theory, that any light stimulation of the facial nerve causes a smile, is unlikely. The emotional expression is elaborated in the central nervous system and is specific in character for each emotion. It is not the mere overflow of stimulation into motor channels of outlet.

[2] "Le sourire," *Revue philosophique*, 1904, LVIII, pp. 1-23, 136-151.

The experiments of Bechterew[3] would indicate that the elaboration of the emotional expression is not in the cortex but probably in the optic thalamus and perhaps also in parts of the lenticular and caudate nuclei. Bechterew separated the cortex from the optic thalamus in animals and found that mimicry was still possible with them. This, he says, was so in spite of their loss of intelligence and emotional life. It is hard to see how Bechterew proved that emotions were not present in these animals. He points out that mimicry was still possible with them. That is to say, they acted and behaved like animals experiencing an emotion. How does he know that they did not experience it? He simply assumes that the emotion was absent because the cortex was separated from the whole central nervous system from the thalamus down. His argument for assuming that the emotional expressions in these animals is pure mimicry was, first, because the uninjured animal often makes them spontaneously without sensory or visceral stimulation, but the animal deprived of its hemispheres makes these movements solely in response to external stimuli. Secondly, the uninjured animal is capable of inhibiting its facial movements in the presence of an external stimulus, but the thalamic animal is not. These considerations only show, however, that the cortex exercises an influence on facial expression. They do not show conclusively that the thalamic animal is absolutely devoid of emotional life.

Something akin to Bechterew's experiments with animals happens occasionally when a human being is afflicted with a thalamic lesion. In such cases we do not have the thalamus separated from the cortex, but we have a state of hyperactivity in the thalamus. Such patients, on wholly inadequate provocation, in spite of themselves, break out into spasmodic laughing or crying. To the observer, they seem to be affected by the most violent sorrow or hilarious joy. If the Lange-James theory is correct, these individuals should experience the emotion corresponding to the outward expression, but, as a matter of fact, when thalamic patients burst out into laughter or into sobbing and tears, the only emotion they experience is one of shame for making such

[3] *Fide* d'Allonnes, *Journal de psychologie*, 1906, III, pp. 132–157.

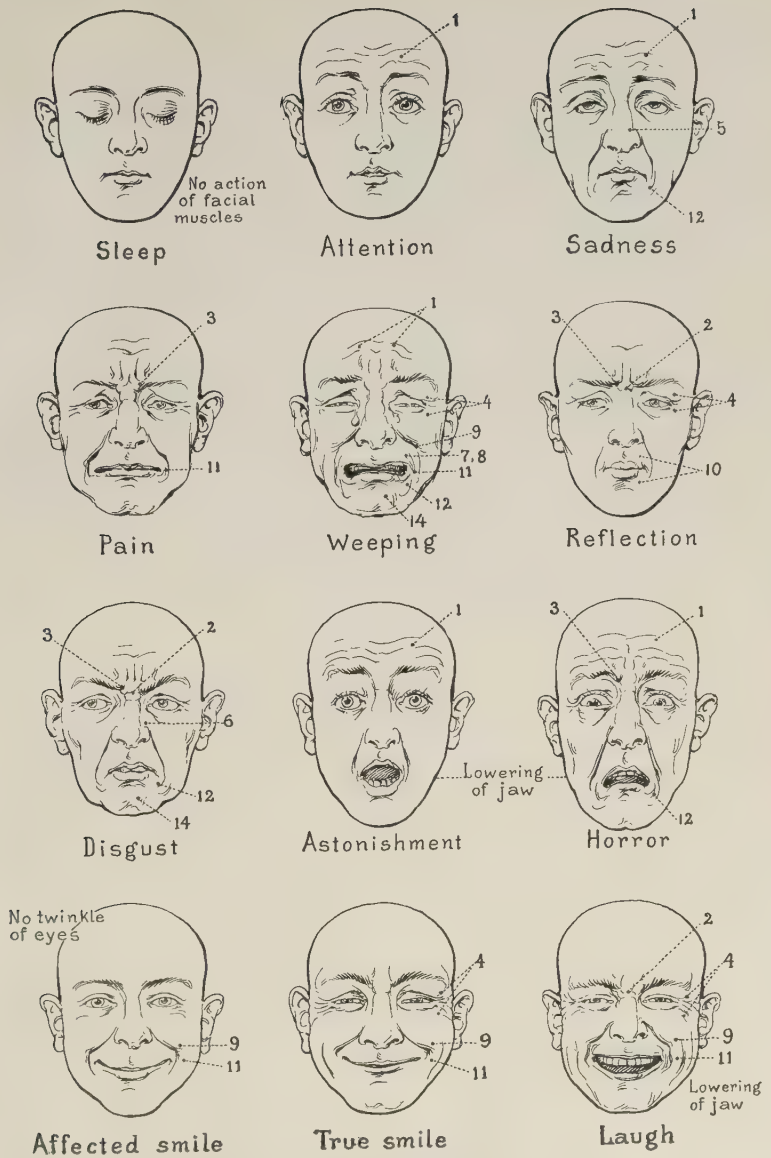


FIG. 4.—MUSCLES OF EXPRESSION IN ACTION.

Numbers are those of muscles shown in Fig. 3. Each emotion is associated with a specific group of tension areas in the skin, whose production is due to a definite kinetic unit (see Part VI, Ch. iv). The function of the emotional kinetic units is to manifest the subject's feelings to others, not to reveal them to himself.

fools of themselves. They are neither gay nor sad, but are forced against their will to give forth the most violent expressions of intense sorrow or joy. Otto Spiegel reports:

"The laughing is not the effect of mental abnormalities, but takes place without a happy idea and feeling of pleasure. Oppenheim has followed up this symptom carefully and has come to the conclusion that this laughter which takes place against the patient's will is to be numbered among the common symptoms (of multiple sclerosis) and is often present early in the disease." "But," he continues, "the inclination to passionate, convulsive outbreaks is by no means always present. But this mimicry is called forth only more easily than in healthy days and without a corresponding occasion. Its duration and intensity are generally more or less reinforced.

"On the basis of the cases I have studied, I have come to the same conclusions. This forced laughing was present in seven cases (out of thirty-four) and was experienced by the patients as really painful. Thus, a patient told me that it cost him a great deal of trouble during the period of his military service to suppress his laughter. And he designated this involuntary emotional expression as most tormenting."[4]

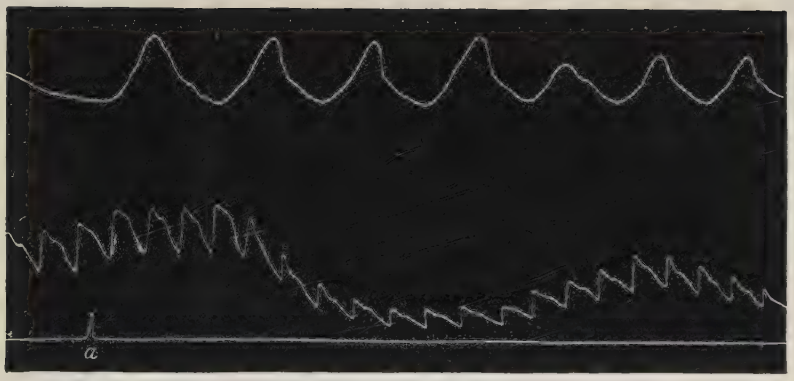
The pathological data of the phenomena of forced laughing and crying give negative evidence, therefore, against the Lange-James theory. Where one would expect to find confirmation of the theory, one discovers that the perception of bodily resonance does not constitute the emotion.

We may now ask whether or not facial expression helps to give a specific character to the whole emotional complex. It seems that it may be one of the elements in determining the peculiar specific characteristic of a definite emotional complex. The facial expression certainly varies with every emotion. This expression is produced mainly by the activity of one muscle or a group of muscles. Other muscles act in a secondary manner, reinforcing the effect of the principals. It is also true that we are conscious, though only dimly conscious, of the tension of these facial muscles

[4] *Ueber psychischen Störungen bei der disseminierten Sklerose*, Berlin, 1891, III, p. 27.

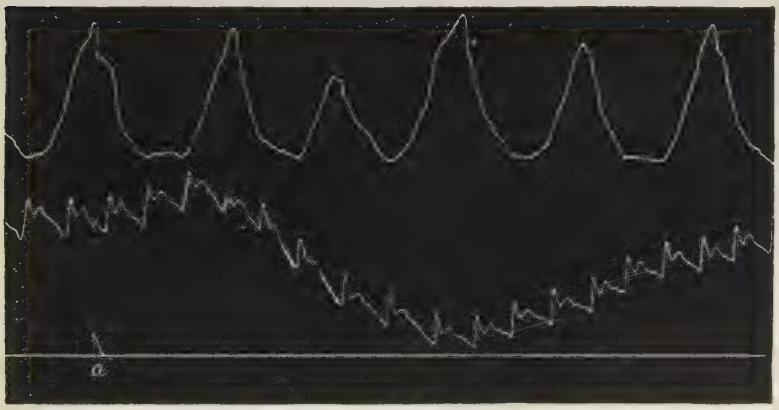
—a tension which varies in its locality and distribution with every emotion. If we ask ourselves whether or not the emotion consists in the perception of this facial expression, it must seem to impartial introspection that the perception of this facial tension, so obscurely conscious, is a very small element in the complex experience of the emotion. It may help to specify that experience, but its aid is unimportant and almost negligible. Persons suffering from a unilateral facial paralysis certainly do not have their emotional life reduced one-half by such a trauma, nor could we get rid of a depression or influence perceptibly a person's normal emotional life by sectioning both facial nerves. We cannot hope, therefore, to get very far with the explanation of our emotional life by confining ourselves to a study of the tension of the facial muscles.

II. Cardiovascular and Respiratory Changes.—The changes in respiration, increase in its frequency, variation in its depth or shallowness; variations in the rate and frequency of the heartbeat; rise and fall of the blood pressure are phenomena which constitute a considerable portion of the bodily resonance of our emotions. It is possible for us to study them experimentally by two pieces of apparatus, the plethysmograph and the pneumograph. The plethysmograph was first used by the Italian physiologist, Mosso. It consists of a glass cylinder. One end of the cylinder is closed except for a stop-cock through which water may be let in or out. The other end is open and provided with some kind of rubber cuff, or sleeve, into which the arm may be placed, and by means of which the water in the cylinder is prevented from escaping. From the top of the cylinder projects a small tube into which the water rises when the cylinder is somewhat overfilled with water. The column of water in this tube rises and falls with each beat of the heart. It also rises and falls with increase and decrease in the volume of blood in the arm. This volume of blood in the arm is dependent upon the distribution of the blood in the rest of the body, which is again dependent upon the distribution of the vascular tension. This vascular tension varies in emotional states. By this apparatus, therefore, we have a means of studying the cardiovascular changes present in



Courtesy Wundt's *Elements of Physiological Psychology* (Engelmann).

FIG. 5.—Respiratory and volume-pulse curve during a weak pleasant-unpleasant emotional state. At (*a*) transition from pleasant to unpleasant mood.



Courtesy Wundt's *Elements of Physiological Psychology* (Engelmann).

FIG. 6.—Respiratory and volume-pulse curve following an emotion of fear.

the emotions. A curve of these changes is obtained by connecting the top of the tube with a recording device known as a Marey tambour. This consists of a shallow metal cup covered above with a rubber diaphragm. The wall of the cup is pierced by a little tube which connects by a rubber tube with the top of the tube of the plethysmograph. It is readily seen that when the volume of the arm increases, the water in the tube of the plethysmograph rises and forces the diaphragm upward. A lever connected with the top of this diaphragm moves up and down, therefore, with the water in the plethysmograph. This lever writes on the smoked paper of a revolving drum or kymograph, and thus a curve of the cardiovascular changes is obtained.

The pneumograph consists essentially of some kind of an elastic tube or capsule which is placed around the chest of a subject. The interior of this tube or capsule is connected by rubber tubing with a Marey tambour. It is evident that with the expansion and contraction of the chest pressure is exerted upon the tube or capsule and air is forced out of the pneumograph or sucked back into it. This current of air operates the diaphragm of the Marey tambour which records the movements of respiration on the smoked paper of a revolving drum or kymograph.

One may experiment upon the emotional expressions in two ways:

(1) He may attempt to produce the emotion by external stimuli. This is easily possible for the simpler feelings of pleasure or pain. It is rather difficult for the more complex ones of joy, anger, etc.

(2) The experimenter may tell the subject to imagine something which makes him sorrowful or sad and indicate the moment when he first feels his emotion by pressing some kind of a recording device.

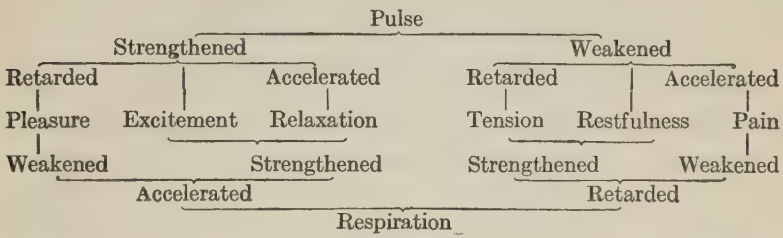
According to the Lange-James theory of the emotions, one should experience the emotion after or at least simultaneously with the cardiovascular and respiratory changes, but, as a matter of fact, these changes take place always after experiencing the affective state. There is a definite interval which elapses between the stimulus causing pleasure or pain or between the movement

made by the subject which indicates his emotion and the subsequent rise and fall of the lever indicating a change of blood volume in the arm.

Experiments in hypnotism with suggested emotions give results which have some bearing upon the Lange-James theory of emotions. A suggested feeling such as a pleasant taste or a bad smell or a pain in the arm has no sensory cause which could reflexly determine the emotional expression. If the Lange-James theory is correct and the perception of the changes constitute the bodily resonance, then we should expect that it would come definitely later than the changes recorded by the plethysmograph and the pneumograph. Experiments on this subject were made by the writer in association with Doctor Wrinch at the University of California. We found that suggested feelings produced qualitatively the same plethysmographic and pneumographic changes as feelings caused by actual sensations. There was no doubt, therefore, about the expression of the suggested feeling being identical with that of the real feeling caused by actual stimulation. The plethysmographic changes come definitely after the suggestion and at approximately the same interval of time as elapsed between the sensory stimulation and the cardiovascular and respiratory changes. There can be no cause of these changes except a mental state. The changes are not suggested by the experimenter, but the emotion. It would seem, therefore, that suggested emotions produce the bodily changes and not that the bodily changes produce the suggested emotion.

We may now ask ourselves whether or not the cardiovascular and respiratory changes are specific in nature so that they vary with our different emotions. There can be no doubt that, in general, pleasant emotions slow and strengthen the pulse, unpleasant ones accelerate and weaken the pulse. Pleasant emotions, in general, accelerate breathing, unpleasant ones in general retard it. One will find variations from these characteristic changes in a series of experiments, but they may well be due to the clouding of one simple feeling by effects that are due to concomitant mental states. Wundt goes so far as to point out definite specific changes for all of his six forms of feeling. He claims that charac-

teristic respiratory and cardiovascular changes are to be found for these six forms of feeling in accordance with the accompanying schema. Other observers have not been able to confirm the results that were obtained in his laboratory. It may be, however, that variations from the schema are due to clouding of a simple feeling by the presence of other feelings in consciousness. At



best, however, the extent to which cardiovascular and respiratory changes are characteristic and specific to each emotion is a matter of serious doubt.

Quite another problem arises when we ask ourselves, can the perception of these changes constitute the emotion itself? Against this supposition is the fact that for milder intensities of feeling the normal subject is not aware of any change in the action of his heart or of his respiration. He is, however, experiencing an emotional state and has no difficulty in reporting this as a fact of introspection. Whether or not his blood pressure is rising or falling, whether his heart is beating more or less intensely or with increased or reduced rapidity—of all this he has no inkling. Changes, therefore, that we may record, but of which we are not aware, cannot be looked upon as facts of experience the consciousness of which constitutes our affective mental states. It would, therefore, seem that while cardiovascular and respiratory phenomena may to some extent be specific for different feelings and emotions, nevertheless, the dim perception of these changes cannot be looked upon as constituting the emotion itself. At most the perception of these changes can be an element in the sequence of events of intense emotional experiences. Here in all probability they become a very perceptible element in the bodily

resonance and they may help to give to the emotion its peculiar characteristic, specific tone.

III. Visceral Changes.—The perception of visceral changes comes to us, in the main, from afferent impulses that are brought to the sensory nervous system by sympathetic fibres which pass from the sympathetic ganglia by way of the gray *rami communicantes* to the posterior roots of the spinal cord. Besides this route there is another. A considerable number of impulses get to the brain through the vagus and the glossopharyngeal nerves. Sherrington has made some experiments on dogs[5] which indicate that the perception of these visceral changes has nothing to do with the apparent emotional life of these animals. Sherrington severed the spinal cord of five puppies in the lower cervical region. This cuts off all visceral sensation except those that are mediated by the vagus and the glossopharyngeal. During many months of observation the dogs manifested no change whatever in their emotional behavior. Impartial observers were unable to detect any difference in their behavior from that of normal dogs. In two of the animals he later on cut both of the vagi. The emotional behavior of these animals remained entirely unaffected. There are two possible interpretations of Sherrington's experiment.

(1) We may assume that the emotional expressions manifested after the operation represented true emotions. If this is so, then the perception of the visceral changes has nothing to do with an emotion.

(2) The emotional expressions were merely mechanical reflexes and real emotions were lacking in these animals because the visceral changes were unperceived. If we assume that emotions were lacking in these operated animals, we must also assume that the perception by these animals of their emotional expressions could not constitute the emotion.

In other words, Sherrington's experiment, while not conclusive, rules out either the visceral changes or the facial expressions, the prickig up the ears, etc., as the essential constituent elements of the emotions.

[5] *Proc. Roy. Soc.*, London, 1900, Vol. LXVI, pp. 390-403.

The problem cannot be solved by animal experiment for we can never learn from the animal whether or not it has any emotions. In human beings, however, who have suffered a fracture of the spine, producing a complete interruption somewhere in the cervical region of the cord, we do not find that their sorrow over their plight, their despair, their chagrin, their depression when they look forward to the future of incurable paralytics, are any less than that of other patients who because of some other injury are incapacitated for life. Loss, therefore, of all the visceral sensations except those mediated by the vagus or glossopharyngeal does not deaden the emotional life of human subjects. He would be a rash theorist indeed who would attempt to lessen the inner depression of the spinal paralytic by suggesting a sectioning of the vagi.

When James said[6] "that the best proof that the immediate cause of emotion is a physical effect on the nerves is furnished by *those pathological cases in which the emotion is objectless,*" he should have considered that a patient's mode of action often seems objectless to us and wholly unmotivated because we do not know his inner trend of thought. The deeper we study the abnormal mind, the more we find that bizarre and unreasonable types of behavior have their roots in definite complexes which are often unconscious, at least in their relation to the subject's behavior. It is the complex which produces their apparently unmotivated emotional states. As for patients that he refers to, who suffer from precordial anxiety, modern psychoanalysis has found psychogenic factors in precisely this type of case. This anxiety is due to a buried complex and this buried complex producing the anxiety causes the cardiac changes. In other cases in which there is an organic basis such as in angina pectoris, the cause of the patient's anxiety is not merely the sensations he experiences in the cardiac region but also the fact that he realizes that some day he is going to die in one of these attacks. This knowledge of the fatal nature of his disease produces his anxiety. Were this knowledge absent, were there no intellectual grounds

[6] *Psychology* (Briefer Course), 1907, p. 377.

for fear, he might experience pain indeed, but he would not be anxious about his condition.

Walter B. Cannon[7] has given us a new method of studying cause and effect in the visceral changes of emotional resonance. He attempted to find out whether or not adrenalin is secreted in the emotions and what effect it has upon the bodily changes which are known to accompany the various emotions. To do this he made some very interesting experiments on cats. With ethyl chloride he anæsthetized the skin directly over the femoral vein, high in the groin. With this anæsthetic and by gently handling the animal it was possible to manipulate it without causing any emotional disturbance whatsoever. The femoral vein was bared, cleared and opened, and a long, fine, flexible catheter lubricated with vaseline was passed into it and thence through the iliac vein and vena cava to a point where the opening in the catheter was about at the level of the opening of the renal vein into the vena cava. In this way blood could be withdrawn practically from the renal vein without disturbing the animal. Cannon says that he has known cats to purr gently during the whole operation. The presence of adrenalin in the blood was determined physiologically with a special apparatus for recording the movements of a short segment of a rabbit's intestine. If a substance containing adrenalin is added to the solution in which this intestinal loop is suspended, it produces a series of contractions. So sensitive is this procedure that adrenalin may be detected by it with dilutions as great as one part in 200,000,000. By this apparatus one may compare the effects of normal blood obtained from the renal vein when the animal was unexcited, with blood taken during the excitement of some emotion. To produce this excitement, the animal might be etherized or a vicious dog brought before the cat tied down on its board, etc. We are thus provided with a new method of studying the effects of the emotions.

Cannon points out the following physiological effects of the emotions:

(1) *The secretion of adrenalin.* In every violent emotion whatsoever adrenalin is poured out from the adrenal glands into

[7] *Bodily Changes in Pain, Hunger, Fear and Rage*, New York, 1915.

the blood. This secretion of adrenalin is the ultimate cause of all the other effects that he enumerates.

(2) *The increase of blood sugar.* In normal individuals sugar is present in the blood from 0.06 = 0.1 per cent. When sugar is present to this extent none escapes in the urine. If it rises higher than 0.2 = 0.3, sugar is found in the urine, *i.e.*, a condition of glycosuria is produced. Such an increase in blood sugar can arise from emotional disturbance. Glycosuria, therefore, is one of the effects of the emotions. The evidence for this is:

(a) It is possible that some cases of diabetes are due to great emotional excitement.

(b) States of depression are sometimes accompanied by glycosuria.

(c) The injection of adrenalin can cause glycosuria.

(d) Animals under the influence of pain and fear excrete sugar in the urine.

(e) Experiments with human subjects show that glycosuria may be present after a hard examination. Twelve out of twenty-five foot-ball players had sugar in the urine after an exciting game. "The only excited spectator of the Harvard victory, whose urine was examined, also had a marked glycosuria which on the following day had disappeared."[8]

(f) Cannon undertakes to prove that the increase of sugar in the blood and its subsequent appearance in the urine is due to the functioning of the adrenal glands, and in so doing he shows also that the functioning of the adrenal glands, and the visceral changes that depend upon them, are not at all necessary for apparent emotions in animals.

(1) It is evident that the secretion of sugar is due to the adrenal glands, because the artificial stimulation of the splanchnic nerves produces glycosuria. The splanchnic nerves contribute the fibres of the adrenal plexus, that is to say, the nerve fibres that govern the activity of these glands. It is thus likely that in an emotion the splanchnic nerves carry stimuli to the adrenal glands inciting them to activity.

[8] Cannon, *op. cit.*, pp. 75, 76.

This results in the secretion of adrenalin and thus finally in the appearance of more sugar in the blood.

(II) If one removes the adrenal glands, the emotions no longer produce a glycosuria. "Although the animals deprived of their adrenals manifested a general lessening of muscular tone, they still display much of their former rage or excitement when bound. Indeed, one was much more excited after the removal of the adrenals than before."[9] One could not, however, by any degree of excitement produce in them a glycosuria. It thus appears not only that the adrenal glands are necessary for the secretion of sugar in the emotions, but also that these glands and the visceral changes which they produce are not necessary for the production of the emotions.

(III) Improved muscular contraction. One of the effects of the emotions is, as we have seen, the secretion of adrenalin. Adrenalin has long been supposed to have an effect on the general muscular tonus. This supposition has been based upon symptoms which characterize Addison's disease, a pathological condition due to destruction of the adrenal glands, usually by tubercular process. In this disease one of the characteristic symptoms is general weakness—the loss of the tonus in the muscles and rapid fatigability. It would seem that the loss of the secretion of adrenalin due to destruction of the glands results in a decrease of muscular efficiency. Experiments made on rats show that when they are deprived of their adrenals, they are more quickly exhausted in a revolving cage than normal animals. Experiments with the frog indicate that the injection of adrenalin had an invigorating effect on muscular contraction. Cannon has demonstrated the fact that in the living warm-blooded animal stimulation of the splanchnic nerves improves muscular contraction. The reader will remember that we pointed out above that the splanchnic nerves supply the fibres which go to constitute the adrenal plexus and that their stimulation produces an increased secretion of adrenalin. Cannon, there-

[9] Cannon, *op. cit.*, p. 78.

fore, isolated the *tibialis anticus* and its anterior tibial nerve and the splanchnic nerves. By proper protective devices against drying, etc., it was possible to stimulate continuously the *tibialis anticus* and during this stimulation to give the splanchnic nerves a series of rapid uninterrupted shocks from an induction coil. This produced a short rise in the height of the muscular contraction which might be attributed to the concomitant rise in blood pressure. This was followed by a prolonged rise which seemed to be due to the secretion of adrenalin into the renal veins. For if the renal veins were clipped and the splanchnic nerve stimulated, the rise of blood pressure and the concomitant brief increase in muscular contraction occur as before, but it is not followed by the prolonged rise which takes place when the renal vein is not obstructed.

(iv) Restoration of fatigued muscle. Cannon and his students have found that within five minutes after an injection of 1.01 = 1.05 cubic centimetres of adrenalin (1-100,000) the fatigue threshold of a muscle is considerably decreased. That this reduction of fatigue is due to adrenalin and not to an improvement of circulation in the muscle by raising the blood pressure is evidenced by the fact that the improvement in muscular contraction takes place when the adrenalin is administered in such a dilute solution that it produces a fall instead of a rise of the blood pressure.

(v) Hastening the coagulation of the blood. Injecting adrenalin into the circulation reduces the time required for the coagulation of the blood. It is interesting to note, however, that adrenalin does not produce this effect on the blood when it circulates only in the anterior half of the animal. Thus, if ligatures are tied around the aorta and the inferior vena cava immediately above the diaphragm, the coagulation time is not shortened. Furthermore, in an animal from which the gastrointestinal canal and liver have been removed coagulation time is not shortened. Mere failure, therefore, of the blood to circulate through the intestinal organs makes it impossible for adrenalin to shorten coagula-

tion time. If the activity of the liver is ruled out by ligature of its vessels or by phosphorus poisoning, the coagulation time of the blood is lengthened. Cannon, therefore, supposes that the liver continually contributes to the blood one of the factors in the coagulating process. This factor can be stimulated by adrenalin. Moreover, stimulation of the splanchnics shortens coagulation time, but only if the adrenal glands are intact. Coagulation time is hastened as the result of painful stimulation and emotional excitement. We thus see that one of the effects of the emotions is the decrease in the time it takes for the blood to coagulate.

The work of Cannon and his pupils which has here been briefly analyzed is the most important contribution that has yet been made to our understanding of the bodily resonance. Cannon himself has pointed out the utility of the bodily changes which are produced by emotional excitement through the activity of adrenalin. The fundamental effect of the emotions is, first of all, the secretion of adrenalin. The adrenalin then produces effects which would be of use to an animal in the conflicts which often follow upon emotional excitement. The increase of blood sugar is nothing more nor less than the mobilization of fuel whose metabolism sets free the energy of muscular contraction. In the struggle which is likely to follow upon emotional excitement, the energy of the organism will necessarily be called upon. The emotion, therefore, by a definite mechanism sets free the energy that will be required for the struggle. Furthermore, not only is the fuel increased, but the mechanism of the machinery seems to be improved. Muscular contraction is increased and its fatigability is decreased, and the process by which the mechanism is restored to normal after fatigue is accelerated. If in the struggle which ensues the animal is wounded, the very anger which this wound produces sets into activity a mechanism by which the blood is more quickly coagulated and its loss so far as possible prevented.

We may now ask whether or not the visceral changes pointed out by Cannon could constitute a group of specific

phenomena the perception of which would give to an emotion its peculiar characteristic quality. It would seem that this is not the case. The changes pointed out by Cannon are not specific but common to all emotional states. The perception of these changes, therefore, would give us only emotional excitement, not specific emotion.

We may ask also whether or not these changes occur soon enough to constitute by their perception or awareness in consciousness the emotion itself. Here again it seems that they are phenomena which must occur too late to constitute the emotion. The sudden presence of danger arouses at once an emotion of fear, but a perceptible time escapes between the perception of danger and the visceral changes to which Cannon has called our attention. The splanchnic nerves must be stimulated. This is the first stage of the process. This stimulation must pass to the adrenal plexus, the gland must be set into activity, the products of this activity must find their way into the renal veins, and the blood containing this adrenalin must then pass to the vena cava and thence to the heart to be redistributed to the organs of the body and affect them in characteristic ways. To accomplish all this, something more is needed than a small fraction of a second in which an emotion of fear arises at the sudden presence of danger. It seems rational to look upon the perception of the danger [10] as causing the emotion and the emotion as bringing about the stimulation of the splanchnic nerves, which is responsible for the further sequence of events in the emotional display. Once the series of processes has been set up, the emotional resonance is no doubt perceived, and its perception constitutes an important element in the complex series of events of which the emotion is constructed.

[10] F. L. Wells, *Journal of Experimental Psychology*, 1925, VIII, pp. 64–76; measured the reaction time for discrimination of pleasantness or unpleasantness finding a median value of 700 sigma. In order to obtain the net upper limit of the latent period for feeling we must subtract in Well's experiment the time of a discrimination choice reaction from his 700 sigma. The time for a discrimination choice reaction between two hands (as used by Wells) is given by Wundt as over 300 sigma. The upper limit of emotional latency, therefore, is less than 400 sigma or 2/5 of a second.

CHAPTER III

SUMMARY OF THE THEORY OF THE AFFECTIVE MENTAL STATES

We may now summarize the main points at which we have arrived in discussing the affective mental states:

I. The affective mental states must be distinguished clearly from our representative processes, for they have characteristics of their own which cannot be confounded with our sensations, mental images, and concepts.

II. In the affective mental states themselves we may distinguish two groups: The first group consists of simple feelings, such as pleasure and pain. The number of these simple feelings is as yet an unsettled problem. It seems likely that they are much more numerous than has as yet been supposed. The other group consists of more complex states which are usually termed emotions. Each emotion consists of one or more simple feelings along with concepts, sensations, and a more or less complex bodily resonance which is partially specific and partially common to all emotional states. An emotion, therefore, is a complex group of phenomena.

III. Simple feelings may be divided into two classes: (a) Those that arise in response to mere sensations, (b) those that arise in response to meanings and intellectual insights. The latter class are affective elements that give to an emotional complex its specific character.

IV. The affective mental states cannot be looked upon merely as attributes of sensation. They are independent forms of our mental life.

V. The affective mental states are not sensations.

VI. Every human emotional complex has an important element—intellectual insight into the situation that is involved. This insight into the situation is the cause of the emotion.

VII. The emotion produces a number of complex phenomena which we may term its bodily resonance. The Lange-James theory which regards the emotional resonance as the cause of the emotion reverses the real order of sequence in the causal process which relates the emotion to its expression. Since, however, an emotion is a complex process consisting of a whole series of events in temporal sequence, the perception of the bodily resonance must necessarily be an element in the emotional complex. This bodily resonance is unquestionably perceived, and because it is perceived constitutes one event in a series of phenomena which makes up the emotional display.

VIII. The emotional resonance is not merely a means of perceiving the emotion, but it involves mechanisms that are highly teleological in character. The results of the emotion are useful to the animal organism. In the present stage of human development some of these mechanisms have outlived their utility.

PART IV

THE DRIVING FORCES OF HUMAN NATURE AND THEIR ADJUSTMENT

CHAPTER I

INSTINCT AND IMPULSE

PSYCHOLOGICAL analysis has so far failed to give any satisfactory reduction of our instinctive life to an orderly group of elementary units. One reason for this may be the fact that the starting point in the study of instincts has usually been the terminology of popular speech. It has been assumed apparently that such terms as the instinct of self-preservation, the parental instinct, the play instinct, the fighting instinct, etc., are definite psychological units. But is this the case? To assume that it is, without further analysis, is certainly not a scientific procedure.

On the other hand, progress in the study of instincts has perhaps been delayed by the assumption that instincts are to be reduced to reflex action, so that there are no such things really as instincts in the mental life of animals, but only a more or less complicated series of reflex actions.

"Instinct," says Herbert Spencer, "may be defined as compound reflex action."[1] Since his day the instincts of animals and men have been often characterized as chains of reflex actions. There has been, however, no extensive attempt to analyze these chains of reflexes and pick out their neural path—nor even to point out the series of stimuli which bring about the series of responses. If we look closely at the instinctive reactions of animals, we see that the series of events is usually comparatively short, and that the links of the chain of events are not all of the same character. The term "compound reflex action," concatenated reflex, chain of reflexes, is, therefore, likely to be misleading, in that it suggests the idea of a more or less lengthy series of events, all the items of which are identical in nature and bear the essential characteristic of a stimulus producing a definite response promptly and with mechanical necessity.

Is this the case? Let us look at the details of a few instinctive reactions.

[1] *Principles of Psychology*, Vol. I, ch. V, p. 194.

Watson made a very interesting study of the behavior of the noddy and sooty tern, that seems on superficial analysis to bear out the concept of the concatenated reflex. He noticed how the parent bird would go off in a quest for minnows. He would then return with his crop full and sit on the edge of the nest. The young birds would then peck at his beak. In response to the stimulus of pecking, the food in the parent's crop would be regurgitated into its mouth and then deposited in the beak of the young.

The feeding of the young by the parent here described is a typical instinctive action. It consists essentially of two elements: (a) The regurgitation of the food and (b) the depositing of this food in the mouth of the young. It is possible that the first element is a typical reflex. We may suppose that, without the stimulus of pecking on the beak, the old bird would be unable to regurgitate the food. We assume, in other words, that it is not a movement over which the bird has an internal control, as it does over the flapping of its wings. We may suppose a neural mechanism connecting the beak with the musculature of the crop. When the receptor area has been adequately stimulated the musculature of the crop contracts, due to this stimulation, and the food is mechanically regurgitated into the mouth. All this is assumption, and perhaps the most probable assumption. If, however, someone were to prove that the noddy tern had as complete control over the musculature of its crop as of its wings, one might doubt the existence of a reflex action. For the reaction might *possibly* be due to the tapping appealing to the parental feeling of the old bird, who then regurgitates it by something more akin to a voluntary act similar to the flapping of its wings. If this were the case, then we would not speak here of a reflex action but of something different. It would resemble what we term impulsive actions in ourselves.

The next element in this instinctive action is the depositing of the food in the mouth of the young. This is different from a reflex action, because it involves a motor coördination that must be varied each and every time it is executed. Any sufficiently intense contraction of the crop will bring the food on all occasions

into the mouth of the parent. From one occasion to another contractions of the crop vary only in intensity; but depositing the food into the mouth of the particular fledgling that happens to receive it, involves a different muscular coördination every time it is done. The mere fact of the presence of the food in the mouth causing certain sensations, then, is not an adequate stimulus, as pecking may be the adequate stimulus for the regurgitation. It is not sufficient for the parent bird merely to get the food out of its mouth anywhere and anyhow. It must deposit it into the mouth of its young. This requires coördination and critical control dependent on incoming visual sensations. It is something more than the fixed and stable stimulus and response reaction of the pure reflex. Granted that the first element of the feeding process is a reflex, the second bears characteristics that do not belong to the typical reflex action. In this instinctive reaction there is, therefore, one element at least which cannot be considered a reflex. We may term it an impulsive action; and the tendency to perform it an impulse.

Let us take another example. I once had the opportunity of watching a parent pickerel guarding her brood of young. For some days she encircled incessantly the little school of minnows that were rather closely huddled together. Whenever one would go back to the spot, there was the big fish slowly moving around the little ones. Is it really possible to explain this behavior as a reflex action? We would have to suppose some kind of stimuli, perhaps chemical, emanating from the little fish that jerked the big fish's tail just enough, and in just the right way, to keep it constantly in its orbit; and another set of stimuli emanating from the big fish that coördinated the movements of the little fish, so that they always stayed together in the centre of the orbit.

It seems that we cannot have in this piece of behavior the fixed and invariable stimulus and response reaction of a reflex, but the sensori-motor coördination of quite a different psychological unit, to which we give the name of impulse.

Concept of Impulse.—Analysis, therefore, of some animal instincts reveals a reaction less stable than the reflex, subject to modification and improvement which resembles similar types of

reaction in ourselves which we term impulses. We may, therefore, regard this type of reaction as one element in the instinctive complex.

In our own consciousness we can distinguish the tendency that we perceive to execute some movement, from the movement itself. The term *impulse* applies more properly to this consciousness of a tendency to action. The action itself is not the tendency nor the awareness of this tendency, but its result. It may be designated as an *impulsive action.*

Though the term "impulse" has been applied mainly to motor activity, it may have a broader application. For we experience not only tendencies to movement but also other tendencies which, while connected with movements, are mainly directed to sensations. Thus, we have tendencies to make use of our senses as occasion may arise, to look, to listen, to smell, to taste, to touch. Whereas the tendency to strike or to run, which we experience in fear, aims at an action as an end; the movements of the head in listening aim at an action only as a means. For the tendency is not merely to move the head, but to listen for some sound that will be perceived. We have also tendencies to think, to seek knowledge, and to solve problems, tendencies to enjoy pleasant situations and to avoid unpleasant ones. All of these tendencies may be considered as impulses.

It is to be noted that truly impulsive tendencies are not experienced *except in the presence of an opportunity to exercise a human ability.* At least we are justified in restricting the term "impulse" to the consciousness of a drive to exercise an ability when the opportunity presents itself.

If there is no opportunity to exercise an ability, what we experience is not an impulse, but a craving. These cravings we shall consider in the chapter on desires.

We may, therefore, define an impulse as a *tendency that we experience, in the presence of an actual opportunity, to make use of any one of our human abilities.*

Impulses are the real psychological elements in instincts. Much of the discussion about the number and nature of instincts is rendered superfluous by this concept. There are just as many

impulses as there are human abilities. Instincts are merely groups of impulses or desires to which popular parlance has given names. In danger the "instinct of self-preservation" is called into play. This means nothing more than that every human ability that can help to extricate one from the danger is called into action. The parental instinct makes parents employ all their abilities in protecting their children, caring for them and furthering their welfare, etc.

Valuable as would be the study of those groups of impulses in detail to which popular psychology has given names, we must refer this study to social psychology to which it more properly belongs.

Difference between Impulse and Reflex Action.—Having criticized the concept of instinct as a chain of reflexes, and pointed out the fact that there are in some instincts two kinds of links in the chain—one the reflex and the other the impulse—it will be useful to contrast impulse and reflex action so as to differentiate them more clearly.

1. In a reflex action the movement follows promptly and with mechanical necessity upon the presentation of the stimulus. *Immediate necessity characterizes the relationship between stimulus and response in reflex action.* In an impulse, however, the movement may or may not follow upon the presentation of the stimulus. In the human adult the impulsive act takes place as a rule with voluntary consent and often with voluntary guidance and direction. One of the important tasks of education is the development of the control of impulse. This task is possible because the will has direct control over the execution of the impulse. It has no such control over the movement of the simple reflex. This control is more extensive than the narrowly restricted voluntary sphere of influence in the cortical reflex. Thus, one may, for a time, keep back a cough or a sneeze, but eventually the explosive movement overcomes all resistance. The longer the delay the more involuntary and forced does the final movement seem. But one may, under insult, keep back indefinitely the impulse to strike, and if it is finally yielded to, it may be more voluntary and less reflex in character than it would have

been had the individual acted on the spur of the moment. *Immediate necessity does not characterize the relationship between stimulus and response in impulsive action.*

II. Impulsive actions are elements of behavior in which the organism as an individual is involved. In reflex action, on the contrary, only a piece of mechanism possessed by an organism is set in action.

III. Reflex actions are always responses to simple stimuli; impulsive actions, on the contrary, often involve complicated situations. Thus, one may hear a remark from one individual and feel no motor impulse at all. But another person hearing the same thing has to hold back a sudden impulse to strike. Not the sound of the voices, nor the meaning of the words alone, but the whole situation of individual relationship calls forth the impulse to strike.

IV. No impulsive action takes place without consciousness. Many reflexes—all indeed except the cortical reflexes—may be obtained in the unconscious subject.

V. Volition has no part in the production of a reflex movement. It may at most permit it as in the cortical reflex. In the impulse, however, it guides and directs the movement of response.

The Classification of Impulses.—If we define an impulse as a tendency to make use of some of our human abilities, the problem of their classification is relatively easy. They may be classified according to our classification of human abilities. Every ability has its peculiar neurological mechanism. This mechanism involves not only a static structure which may be made use of as a passive instrument; but also a dynamic force which tends spontaneously to action. It is thus that the mind differs from a mere machine. When, now, we come to classify our impulses it seems reasonable to adopt a scheme of division based upon whatever principles of classification of human abilities we have adopted, rather than to divide them according to purposes that the impulsive acts may serve.

To consider all the impulsive tendencies of human nature in detail would make the present volume extend beyond reasonable limits. We shall, therefore, do little more than illustrate the

impulses by a review of the motor and sensory forms. There are also affective and intellectual forms. The affective impulses will find several illustrations in a study of mental readjustments, *e.g.*, the parataxes of depression and anxiety.[2]

Motor Impulses.—The original type of the impulse is the tendency to respond to a present situation by some kind of a movement. We should, however, include under the term "motor impulse," not only special coördinations such as striking, kicking, pushing, hugging, clasping, jumping, etc., but also uncoördinated random movements. One will seek in vain to find special stimuli for the random movements of the arms and legs of the young infant. They may sometimes be pain responses, but not always. They can best be interpreted as proceeding from the inherent mechanism of motor ability which, like all other living structures, needs no other reason for action than its own existence. Random movements, in other words, are not reflex actions, and do not need to be initiated by sensory stimuli. Living muscles and a normal nervous system, and intact connections between the two, are all that are necessary.

The question now arises: Do random movements and random movements alone constitute the original inheritance of the individual's motor equipment; and if so, are coördinate movements learned by selection from random movements? This is certainly not the case. The young of many animals can perform various motor coördinations from their very first entrance into the outside world. This is particularly true of the insects among whom these coördinations are often apparently perfect from the outset. Higher up in the animal scale, inherited motor coördinations are at first imperfect. The young chick pecks from the outset, but experience makes his pecking sure to hit the mark. The young foal capers about soon after birth, but how awkwardly compared to the graceful running of the horse! The young fledgling makes the appropriate movements of flying when first tempted from the nest, but it soon flutters to the ground. The young infant when first clasped to the mother's bosom grasps the breast and commences to suck. When, for the first time, an infant is in appar-

[2] Cf. *infra*, p. 189 ff.

ent danger of falling from the lurching of a wagon, it may clutch the person holding it by an adequately coördinated movement which could not have been learned by experience.[3] We must, therefore, conclude that the mechanism of many coördinate movements is an established element of neurological heredity. Disturbances of equilibrium, for example, act upon the semicircular canals and these transmit the stimulus to Deiters nucleus, to the cerebellum, and also to the cortex by way, perhaps, of the optic thalamus. Through these connections a mechanism for throwing out the arms and grasping whatever may be in reach is set in action. In the young infant this mechanism may be a pure reflex, and even in the adult it approaches the character of a reflex. It seems, however, to be a motor tendency which, unlike the simple reflex, is not executed in unconscious subjects; and unlike the cortical reflexes involves sensori-motor coördinations, *i.e.*, adjustments to present situations. The whole process is rather complicated. It seems to exist prior to experience. It is an hereditary neuromuscular mechanism which comes into play when equilibration reflexes are inadequate to meet the situation. There are many such mechanisms present in the human nervous system. Situations of one kind or another set them in action. They may be inhibited by the adult whose ideals of conduct, etc., exercise a control over the actions of the body musculature. Or they may be the first step in a series of actions continued and directed by conscious voluntary control.

One need not be surprised at the existence of complete neural mechanisms for the execution of fairly complicated motor coördinations. Experiment gives us actual examples. Electrical stimulation of the cortex leads usually to a single movement which, however, is not due to the contractions of only one muscle, but to the coördinate action of a group of muscles, *e.g.*, flexion and extension of arm, hand, etc. In the rabbit one may cause not only such isolated movements, but also a whole series of chewing movements, by the stimulation of the proper area of the cortex. If such a neural mechanism may be set in action by elec-

[3] Cf. Kathleen Carter Moore, "The Mental Development of a Child," *Mon. Supple. Psychol. Review*, No. 3. 1896. Cf. also *infra*, p. 343 ff.

trical stimulation it need not surprise us that the actual situations of life call forth tendencies to even more complicated motor responses.

Motor Impulses and Play.—The original tendency to make use of these inherited motor mechanisms is the first element in the development of play. To crawl, creep, walk, run, are actions whose original stimulus lies in the motor mechanism itself, even though this mechanism may also be set in action by interests that are awakened by sensory stimulation. If, in the course of moving about, one individual meets another, to shove, to push, to pull, to tussle, to grasp, to fondle, etc., are all acts for which there are original motor tendencies with their appropriate neural mechanisms. With animals, play consists mainly in the exercise of these original motor tendencies.

McDougall points out that it is rather peculiar that the dog in play bites but does not hurt, and the kitten paws but does not scratch, and yet there is plenty of muscular power at their disposal to inflict injury. He brings out this peculiarity of play to show that it is not, as Groos' theory would lead us to suppose, a mere premature ripening of the instinct of fighting. He suggests that it is due to the impulse of rivalry.

"The impulse of rivalry is to get the better of an opponent in some sort of struggle; but it differs from the combative impulse in that it does not prompt to, and does not find satisfaction in, the destruction of the opponent. Rather, the continued existence of the rival, as such, but as a conquered rival, seems necessary for its full satisfaction; and a benevolent condescension toward the conquered rival is not incompatible with the activity of the impulse, as it is with that of the combative impulse."[4]

This seems a rather complicated mental mechanism even for the human child, to say nothing of the dog. It might be simpler to suppose that the impulse to an adequate use of the weapons of defense is called out only by a situation from which anger or fear arises. In other situations biting is more akin to tasting, pawing to feeling. If anger is not present, the cat may strike with its paws, but it cannot scratch because the muscles which

[4] *Social Psychology*, 1908, p. 113.

set the claws in position are not in action. The playful animal is often angered, and, when his ire is aroused, he promptly makes adequate use of his offensive and defensive mechanisms.

The exercise of motor impulses may exhaust the concept of play in animal behavior. But this is not true of the child. For the use of original tendencies is always undergoing a process of modification by influences which arise from the activity of other mental functions. Thus, the child reads and hears about the doings of Indians and savages. It is natural to the human mind to desire to live through interesting scenes that are only heard of or read about, in reality if possible, but if not, in imagination. The child, therefore, will at times run away from home to seek the Indian in the far West; but more commonly he is content to play Indian at home. Thus, play becomes modified by imagination. In all probability children's play implies nothing more than the use of motor tendencies under the influence of an attempt to live through in imagination things heard about, read of, or seen, whether in reality or in theatres. The tendency to do all this is an impulse by which we compensate by dreaming for realities that can never be ours. To maintain that the development of the child is the unfolding of the history of the race, and that the play of children gives us an epitome of human history from primitive man to civilized institutions, is an hypothesis for which there is but little evidence. It is at best an analogy based upon the fact that the embryo goes through stages of development in which it possesses at various periods organs that are characteristic of lower animals. Thus, the first secretory apparatus of the human embryo, the pronephros, resembles in some manner the nephritic tubules of the earthworm. These are replaced by the mesonephros similar in structure to the kidney of the frog. Finally there appears the metanephros, the final form of the human kidney. Other organs go through similar stages of development. From such facts we cannot argue that the mind must recapitulate—not merely the mental history of the animal kingdom, but also go through all the stages of development through which the human race has passed from primitive man to the present day. Nor do the facts of child psychology

render the recapitulation theory of human instincts anything more than a naïve speculation.

Sensory Impulses.—Every sense organ carries with it a tendency to action by means of which objects perceived by the sense organ are observed under more favorable conditions. The end of this action is not the movement but the exercise of sensory observation. Movement is the means, sensory observation is the end. Thorndike has grouped together the sensory impulses under the one name, *original attentiveness:*

"Of the situations to which man is sensitive some originally excite the further responses—of disposing him, especially his sense organs and central nervous system, to be more emphatically impressed thereby—which we call responses of attention to the situations in question. Thus, he moves his head and eyes so that the light rays from a bright-colored object moving across the visual field are kept upon or near the spot of clear vision. The features which are so selected for special influence upon man may vary with sex and age, but are substantially covered by the rule that man is originally attentive (1) to *sudden change and sharp contrasts,* and (2) to *all the situations to which he has further tendencies to respond,* as by flight, pursuit, repulsion, play, and the like."[5]

The sensory impulses are characteristic of animals as well as man. To be convinced of this, one need but watch a dog sitting in a window taking apparently keen interest in everything that passes, whining and becoming greatly excited if another dog comes into view, etc. It is peculiar that this impulse gives so much satisfaction also to human beings. As soon as the infant can sit up it becomes at once a keen observer. When it can crawl it wants to feel what it sees, and, if possible, put it in its mouth. The ambition of many an adult seems never to get beyond this infantile interest in watching. Thus, idlers hang around railroad stations, lean against lamp-posts, and, *mirabile dictu,* seem to while away many a pleasant hour in this fruitless occupation; and how many an old person ends his days in peaceful bliss, sitting at a window and watching the passers-by.

[5] *Educational Psychol.,* Vol. I, *The Original Nature of Man,* 1913, p. 46.

In some of these cases the original attentiveness to mere sensations is associated with sexual or other interests, so that the behavior of the idler may be more complex than one would at first suppose.

Neural Mechanism of Sensory Impulses.—The neural mechanism for this impulse consists in the sensory end organ, the sensory nerve and its connection with cerebral ganglia, and the paths which lead from these ganglia to the various motor mechanisms of the central nervous system. Every one of the sensory nerves has a complicated system of connections through reflex centres with various motor tracts. Every one of them also has an ultimate centre in the cortex. If Bechterew's results are trustworthy,[6] the cortical sensory centres are also regions, the stimulation of which leads to such movements as are connected with the functioning of the sense organ, *e.g.*, eye movements, focusing of the lens, etc. Besides such direct connections with the muscular apparatus of the sense organ, each sensory centre has manifold connections with other areas of the cortex. In fact, when one views the complicated histological network of the cerebrum with its cortical tangential fibres and the association fibres of the white matter, one must admit the possibility of at least a potential connection between any one spot in the brain and any other by one or more neurons.

Spontaneity of Sensory Impulses.—The existence of these subcortical and cortical connections would suggest that the sense organ may be focused upon an object of perception, not only by the reflex action of incoming stimuli, but also by conditions originating in the cortex itself. As a matter of fact, tendencies to make use of a sense organ are not confined to those which are produced by incoming stimuli. A situation as well as a stimulus may cause one to look, listen, etc. Interests that can be satisfied only by search, memories of past pleasures, various needs and necessities of life, are far more frequently the source of the use of our senses than the stimuli which impinge upon the organs of sense. The old man sitting at the window not only looks at what he sees, but is also looking for something to see. One may

[6] Cf. *supra*, p. 64.

ramble in the woods and not only listen to the singing of the birds, but also listen to catch the sound of their song. Sensation is not only a passive something, but also involves active impulses to sense. Other impulses subordinate this active power in their own service. Thus, in danger of attack, one does not wait until he hears in order to listen, but listens long before he hears. Such subordination, however, is not necessary. Sensory impulses, as such, exist in man which do not imply the functioning of any other instinctive type of behavior. The mere possession of an organ of sense creates a tendency to its exercise, that is, a sensory impulse strictly so-called.

CHAPTER II

DESIRE

Concept of Desire.—If one experiences a lively impulse in a given situation and inhibits its execution so that the situation passes away, the whole affair is not likely to end with the closing of the little incident. Memory images are periodic—they come and go. The memory images of emotionally toned situations are especially subject to periodic recurrence. It seems probable also that affectively toned situations, in which impulses were voluntarily blocked or accidentally thwarted, have a particularly strong tendency to recur, so that the individual may enjoy in imagination what he misses in reality. Sexually toned situations have this tendency to a marked degree.

If the imaginary going over of the situation with its pictured execution of the impulse is inhibited constantly and effectively, the tendency is present in human nature to dream about the situation at night, either clearly and openly, or in a symbolic fashion which completely obscures the real meaning of the dream, or to take pleasure in doing things that, consciously or unconsciously, have some kind of association with the frustrated impulse.

It is not the impulse which is active in all these transformations of the original situation, but something to which a frustrated impulse gives rise. This resultant of an impulse that is not or cannot be carried out is "desire." The impulse is a tendency to act in a given situation by the exercise of some of our human abilities. A desire is a craving that we experience to seek or produce a situation in which impulsive tendencies may be satisfied. Desire is the torrent of waters, impulsive satisfactions the channels of outlet. It is this torrent of waters that moves the machinery of human activity. It will find its outlet somewhere —if not in the courses that flow along the surface, then in the deeper subterranean levels of the mind. Where the outlet of

desire is going to be is not entirely a problem of mechanics. For there is a power of voluntary direction that opens the locks in one place and closes them in another. The constant resultant of suddenly closing the locks that bar the channel of impulsive action is the rising of the waters of desire. The psychological cause of desire is the temporary or permanent blocking of impulsive channels. It is clear that some outlet must be provided for the forces of our impulsive activity. All the channels cannot be kept closed all the time.

Besides the forms of desire easily recognized as belonging to the native abilities or faculties of the mind, there are also activities that a human being experiences in his life as an individual and in relation to society, for which definite physiological and psychological mechanisms exist.

The activities connected with eating, drinking, and the propagation of the species, though not usually considered as mental, have nevertheless definite physiological mechanisms, and when the opportunity to exercise them is not offered, lead to cravings that constitute a group of the strongest driving forces of human nature.

Besides these there are a number of psychological mechanisms that cannot at first sight be definitely grouped with any single faculty, but affect the harmonious operation of all our abilities in relation to our fellowmen. Thus, all men have a natural craving for the approval of their fellowmen, and make use of all their abilities to attain it. All men have a desire to dominate their surroundings, and make use of all their abilities to do so. And, strange to say, there seems to be an opposite craving of vastly different intensity in various individuals that is often spoken of as the impulse of subjection. It is probably, however, not a definite psychological entity, but is, in part, the mere inertia of the mind that we term laziness, and, in part, one of the many maskings of the sex drive.

All of these cravings, whether physiological or psychological, constitute a fairly well-defined group of natural wants, of which we are conscious only when unsatisfied and the opportunity of satisfaction is not given. The craving ceases and passes into en-

joyment during the process of satisfaction. All cravings must be rooted ultimately in mental capacities, even those that are physical. For the psychological craving is not, for example, to supply the chemical needs of the organism for water, but for the satisfaction that is experienced in drinking.

The craving for the approval of our fellowmen, and to dominate one's surroundings, is rooted in the intellect, in the enhancement of the idea that every man has of himself. Everyone has a tendency to conceive of himself in the highest possible terms and whatever convinces him of his own excellence and importance awakens a satisfaction which once experienced is ever afterwards craved and so constitutes a powerful driving force of human nature. But at bottom the self-idea is but one form of intellectual activity, for the idea of self is not red nor blue, a 32-foot tone nor a one-foot tone, it is not a taste, a touch nor a smell. It is an intellectual appreciation which leads to exaltation when we judge of ourselves favorably, and depression when we cannot help but look upon ourselves in an unfavorable light.

With due reference to the various forms in which desire manifests itself, we may define it as follows:

A desire is a craving that we experience to seek or produce a situation in which impulsive tendencies may be satisfied, or natural wants may be supplied.

The Classification of Desires.—The natural classification of desires must follow the classification of human abilities. Just as we have as many impulses as there are abilities to be exercised, and each ability has associated with it a physiological and psychological mechanism tending to set it in action in the presence of an opportunity, so also every ability has similar mechanisms that produce cravings psychologically recognized as desires when adequate stimuli are not present. These cravings drive the organism, or the individual, to action so that the ability may be exercised and the craving satisfied. All cravings, furthermore, must be capable of satisfying some human activity. Therefore, the natural classification of desires runs parallel with that of the abilities themselves.

We may, however, consider desires from various points of view and formulate many artificial classifications, each useful for special purposes.

Thus, a classification of desires has been suggested into those that have to do with the conservation of the individual and those that concern the conservation and propagation of the race; *conservatio sui et speciei.* Again, desires are classified into those that concern food, clothing, and shelter.

A rather important artificial classification from the point of view of psychology is the division of desires into *conscious* and *unconscious.* Desires meet with the individual's approval or disapproval. Those that he approves of, he admits, satisfies, owns up to; those he disapproves of, he tries to repress, forget, and disown. The resultant is a real psychological difference in desires. (a) A group of surface desires often rather shallow and impotent, and (b) a group of suppressed desires very potent in character, causing disturbances in the mental life of the individual of whose origin and nature he remains ignorant.

Another classification is into sensory and intellectual desires, namely, those that have to do with the lower pleasures of sense and those that have to do with the higher delights of intellectual pursuits. There are several distinctive characteristics that differentiate these two forms of desire.

Sensory desires are inborn or native. Intellectual desires are acquired.

Sensory desires are involuntary. They arise no matter what we do. Intellectual desires are subject to voluntary control.

Sensory desires are modified by satisfaction or the gradual wearing down of time. Intellectual desires may be modified by a system of training.

Sensory desires come and go according to the condition of the organism. They are usually independent of each other, more or less isolated, and not coördinated into a system. Intellectual desires on the contrary, though not always conscious, abide continually with us and are readily built up into a system that constitutes the individual's plan of life.

The plan of life: Human desires have a natural tendency to group themselves into some kind of plan. Until we understand this plan an individual whom we may study remains more or less of a mystery. The grouping of desires into a plan of life is, therefore, a real psychological mechanism and to omit its study would be a serious defect in human psychology.

The gazing into the future, which comes sporadically to all normal human beings, leads naturally to the question, what am I to do with the years that are before me? I am inclined to think that in spite of the question forcing itself on the mind again and again, many individuals, probably the majority, give it no definite answer and make no attempt to plan out consciously a rational disposition of the future. Vocational guidance is rare, but is now becoming more common. Adequate parental help is frequently lacking. Opportunities present themselves and are grasped without a thought of their present adequacy or their future power to satisfy. All sorts of "accidents" happen, parental neglect, the harshness of teachers, the indifference of the outside world, love affairs, books suggesting opportunities are read by chance, friends are met, etc. Emotional and intellectual reactions to these situations determine resolutions and points of view that direct the mind to a dimly or perhaps more or less clearly outlined goal of endeavor. Should a conscious goal never appear on the horizon, some desires will eventually dominate and unconsciously everything in the individual's mind will converge towards their satisfaction.

Individuals without an adequate goal in life are very likely to be doomed to years that please them not when youth commences to fade. I recall to mind a German past the prime of life who came to the clinic for help. He had accomplished nothing in life and had nothing to which he could look forward. He had arteriosclerosis and various accompanying symptoms of a rather premature onset of old age. My attempts to get him to adjust himself to his present situation did not satisfy him at all. He wished to be rejuvenated, as it were, by miracle. One day he broke out in tears and commenced to cry, "Meine Jugend! Meine Jugend! Meine velorene Jugend!" "My youth! My youth! My

lost youth." Had Mephistopheles answered as he did Doctor Faust he would have found a ready subject in this old German.

The lack of a plan of life leading to the wasting of life's most precious years is one of the most serious defects that can occur in anyone's psychological machinery.

Some err by excess in planning their life and give themselves up to idle dreams, in which character defects become dominant.

One of my patients from the time she was nine years old used to spend much idle time in dreaming of her future life. She built in imagination her future home, papered and furnished the rooms, and long before she had any idea of the meaning of marriage, peopled it with her family, idealized her husband, imagined herself cooking, which art she has never yet learned or exercised except in day-dreams. Her craving for sympathy created various scenes in which she fainted, created a commotion in the place where she might be, was surrounded by spectators that pitied her and nursed her. She often rehearsed her death scene surrounded by sobbing friends, etc.

Such a planning of life determines nothing in reality, runs into sexuality and forces separation from the world in an unreal imaginary life. This was pointed out to her and some time later I asked her to recast for me her plan of life and I received the following perfectly spontaneous formulation which may also be regarded as an example of a native tendency to sublimate.[1]

(a) Residence in community, religious, which would be small enough to aid in a certain amount of mutual understanding but not necessarily friendship. (b) Passage of a great part of the time outside school hours in meditation and prayer. (c) Freedom, on my own part, from any trace of feeling of incapability. (d) Growth in my own soul of zeal for gaining other souls for Christ and a consequent killing of all selfishness. (e) True and deep friendship with Christ which would totally supplant all human affections. (f) Great spirit of mortification. (g) Worth as a teacher. (h) Love and understanding for, and power, both mental and spiritual, over pupils. (i) Ability to make everything serve as a stepping-stone to my aim in life.

[1] For the meaning of sublimation, cf. *infra*, p. 241 ff.

Another girl who came to the clinic complaining of depression and hopelessness in life had at the time the following outlook on life involving the shimmering of an unconsciously formulated but clearly inadequate plan:

Both her father and mother drank and she had never experienced from either the affection that she craved. She could never remember that her mother kissed her except formally when she would leave on a trip. She could not bring any friends to her home because she sometimes found her parents drunk on returning to the house.

With this condition of home affairs, she saw nothing but suffering ahead, but had made up her mind to endure it. The idea of leading a life of sin came to her repeatedly. She thought of marriage, but put it out of her head. If she married she felt that she could not accept any but a superior man. She felt herself inferior and incapable of attracting or holding the affection of a superior man. She felt, therefore, that she would eventually drift into being someone's mistress; felt that if this was to come about she would have to leave home, and often contemplated doing so and in some way contriving to let her people think she was dead.

In such a case religion is the only hope. The patient having had a religious education, a positive attempt was made in this case to obtain a religious sublimation.[2] This attempt led to the following plan of life: Love God first and his people afterward. Work for Christ by going some place where she could nurse or care for little children.

One must not think that in order to have a successful plan of life it must be highly idealistic. Such plans are often too unreal to be successful and so lead to failure and disappointment. The simple pleasures of ordinary family life keep the vast majority of the world in a peaceful adjustment to the world and its troubles. Some have no further aim than this. One patient expressed herself to me thus: I want to be nothing more than the ordinary woman who takes care of the house, visits and occasionally drives with her friends. One girl settled down to

[2] Cf. *infra*, p. 241 ff.

a fair state of contentment by starting out to take care of her brother and the chickens.

True nobility after all is not to be found in deeds of extraordinary heroism, but in the ordinary affairs of everyday life. Little things and ordinary occupations are truly worthwhile. This fact brings happiness within the grasp of any man, for anyone can formulate a plan of life leading to the accomplishment of something of value and so attain happiness.

When in a clinic we attempt to get others to formulate a plan of life it is well to remember that what could satisfy ourselves is not necessary or suited to them. I have often been surprised to see how little it takes to awaken new interest, give true satisfaction, redirect and guide a human being who had been hopelessly at sea like a bark that had been cut loose from its moorings.

The Management of Desires.—Dynamic psychology treats not only of the theoretical nature of the driving forces of human nature, but also attempts to give practical directions for the rational manipulation of these forces in ourselves and others. It should, therefore, attempt to deal specifically with the problem of the management of desires and on the basis of a psychological analysis give principles that will be of real value in the control of human conduct.

The following principles are the results of a psychological analysis of desires and are offered as practical guides to conduct:

1. *Human life is so complicated and our abilities are so manifold and opportunities are so numerous that it is a physical impossibility for anyone to realize all his desires.* Simple as this principle may seem, its neglect is often the cause of considerable discontent. It may be neglected in two ways.

a. By forgetting the multiplicity of the objects of possible satisfaction. If a person is disappointed in one thing, or one person, it sometimes happens that he closes his eyes to everything else, or to everybody else. He keeps driving ahead at the impossible much as the *Paramecium* does when it gets into a blind-alley. This microscopic organism backs up in its blind-alley and drives ahead again and bumps its "nose," and does this repeatedly until, perhaps by chance, it backs up too far, and

turns off at a slightly different angle and so escapes from its predicament. Many human beings act precisely in the same way wasting precious years in a blind drive after the impossible.

b. Sometimes, on the other hand, the very multiplicity of the opportunities that life holds out causes a conflict. People forget they do not have to enjoy everything, that in fact it is impossible for them to make use of all their opportunities. Forgetting all this they give way to idle regrets because they must give up some of the many things that are open to them.

2. *All desires are not equally worthwhile satisfying and the criterion of worth in evaluating them is not pleasure but accomplishment.* There are some desires which when satisfied give pleasure indeed in the satisfaction, but when the satisfaction is over there is nothing to show for its enjoyment. This is true of all sensory desires, except perhaps muscular exercises which results in the strengthening of the body. The intellectual desires associated with education when enjoyed leave traces in the mind, which are the foundation of habits of permanent value. These habits are not only means of future enjoyment but also of a livelihood. Those desires should reasonably be considered of greater worth that not only give pleasure but also provide the means of future accomplishment.

3. *It is, therefore, necessary for us to establish a hierarchy of desires in which there shall be one supreme end of life to which everything else must conform.* The establishment of this hierarchy of desires is what we have termed a formulation of a plan of life. From the natural point of view perfection in one's calling or profession in life should be the supreme end towards which everything else should converge. One should pick out some walk in life in which occupation will not only give him a livelihood but also pleasure and happiness. The normal thing is that one should enjoy his life. If you cannot enjoy your profession you should not choose it.

4. *It is clear that in the hierarchy of our desires the lower and sensual should be subordinated to the higher and intellectual; for though the craving for the sensual may be stronger, the satisfaction that comes from the intellectual is vastly more extensive, more lasting, more productive of good to the individual and*

society and fraught with no evil consequences. Only by such a subordination as this will great success in any career become possible. Pleasure should never be an end in itself but merely the oil that makes the machinery of life move more smoothly.

5. *With a clear conception of means and end in our life we must order our labors in accordance with opportunity.* It is sometimes impossible for us to have what we desire because the opportunity is lacking. We should not, therefore, sit down and do nothing until the opportunity presents itself. Careful inspection of our surroundings will always reveal opportunities that are worthwhile. The plan of life, therefore, should be sufficiently elastic to yield to the necessity imposed by the presence or the absence of opportunity.

6. *It is reasonable to exercise self-denial:*

a. *In order that our end may be attained.*

b. *In order that our efficiency may not be impaired.*

Much is said in psychological literature about the evils of repression. Some repression, however, is necessary. Existence in modern life is impossible without the inhibition of many forms of inopportune conduct, to say nothing of behavior that is not lawful. Inhibition is also necessary if a plan of life is to be carried out successfully to its final conclusion. This means retrenching the pleasures of the present for the enjoyment of the success of the future. Unless one is schooled in inhibition and repression this is not possible. We must, furthermore, as we have said, exercise self-denial in order that our efficiency may not be impaired. Barring the accidents of special misfortunes, the main impairment of human efficiency is arteriosclerosis, the hardening of the arteries. According to Osler there are four causes of arteriōsclerosis: Venus, Bacchus, Tobacco, and hard work, either mental or physical. Wisdom dictates self-denial in all of these things in order that efficiency may not be impared. If, however, self-denial is exercised chiefly where it is most often lacking, that is in regard to Venus, Bacchus and Tobacco, the amount of hard work would probably take care of itself, or perhaps would be limited automatically by fatigue long before it resulted in any impairment of efficiency.

CHAPTER III

THE CONFLICT

The Development of the Conflict

We have just passed in review the main driving forces of human nature. These driving forces are the impulses and desires. The impulses, and incidentally the desires, are tendencies to exercise the mental and physical abilities with which we are endowed. From the dawn of life to the twilight of senescence these forces are in constant action, but not always directed toward one unvarying end and not always working together in the same associations and groupings.

The Conflict in Infancy.—At first the sensory impulses to see, to hear, to touch, to smell, to taste are in themselves sufficient to delight and interest the child. Before he can crawl they keep his eyes and ears in ceaseless activity during the waking hours of the day. Soon they become motive forces that send the baby crawling on his first tour of investigation. The motor and sensory impulses are the only kinetic mechanisms in the infant mind and they exist in it in their pristine purity. Thus, the infant wants to hear, see, touch, taste, smell from pure sensory curiosity—to see for the sake of seeing, to hear for the sake of hearing, and not for ulterior ends or for purposes which may in some manner be associated with the act of sensing. Older people often wonder at the ceaseless activity of the child. It is an activity which is produced by the drive of sensory impulses—a drive which is limited only by the physical impossibility of attainment, and which is as yet unhampered by the inhibitions of the moral ideal or altruistic considerations of any kind whatsoever.

The whole energy of the infant is directed towards the satisfaction of sensory curiosity. If his enjoyment of the pleasures of sense is thwarted or cut short he reacts by crying. The usual result of the infant's cry is that someone listens. The mother or the nurse finds out what is wanted and, if possible, supplies it. Very soon the infant learns that he gets what he wants by

crying and commences all unconsciously to strive to dominate the world by appealing to the sympathy of others. He appeals first to their sympathy to supply his unsatisfied desire. Who would not take pity on a crying infant and give it what it wants if he only could? If this desire cannot be satisfied the mother pets and rocks and kisses and hugs to her breast the crying infant; thus, sympathizing with him in his sorrow and teaching him his first lesson in compensation, the compensation of sympathy which makes good the want that cannot be filled. The compensation often more than makes up for the broken toy or whatever the trivial mishap that may cause the infant's sorrow. The compensation is a delight in itself and becomes in itself an object of desire. In every little sorrow it is readily sought and as readily granted.

But there comes a time when no one is near to heed the cry or when those who are near do not heed and the child is left to mourn its little sorrow without any comfort or coddling. It has experienced for the first time the full bitterness of a conflict that it must henceforth wage as long as it lives. The puny strength of its desires is in battle with the inexorable laws of nature or the scarcely less uncompromising wills of uninterested men. The child then puts forth all its energy in the type of reaction that has hitherto met with success. It cries and screams louder and then louder again, it kicks and squirms violently till, wearied with its exertions, it ceases and falls asleep, having lost its first battle in the conflict with reality.

It is good, it is wholesome, it is necessary that many such battles should be lost. We cannot all of us have all that we want all the time. No child is born to be lord and master of the universe and never suffer denials, sorrows, and disappointments. But absolute and supreme dominion is the unconscious aim of every infant until the dawn of reason. In some individuals this ideal seems to last, in spite of the sad lessons of experience, till death puts an end to their conflict.

The uncompromising selfishness of the adult is repugnant to us because we feel that it could and should have been corrected long ago. The unconscious cruelty of the infant is excused be-

cause it is unconscious, and we think that it will be corrected later. But many a family fails to realize the fact that the selfishness of the child passes into that of the man unless the child suffers numerous defeats in its warfare for the dominion of the universe. Gradually and insidiously the infant conquers not the world indeed, but the household. Its whims must be granted, for its crying must be stilled. No tyrant ever exercised a more pitiless and uncompromising sway than that of the infant who has triumphed over the family.

The Conflict in Childhood.—Not many years elapse before the child ceases to be a mere sensory-motor organism. When merely an infant one could teach it its lesson: "Things are not to be obtained by crying," only by letting it cry in vain, without the compensation of petting and coddling for the things it should not have. Little by little it learns to understand what others say to it and to reply with its childish prattling. Now it can learn by simple explanations and examples. What it does not perceive it can be told. It learns that its mother is tired, that she cannot carry it, that she feels badly when it misbehaves, etc. There has been introduced into its behavior a new factor, one that did not function at all when it was a pure sensory-motor organism. Simple *ideals of conduct* commence to limit and restrain the driving force of the instincts as well as the sheer impossibility of their satisfaction.

From now on there is a double conflict—one without, with nature and its inexorable laws, and man and his unbending will; the other within, with its own ideals of conduct. Sensory curiosity drives on as it did in infancy, but now there is a check, a restraining influence. This check is not from without but from within—from the child's own mind, from its ideals of conduct. In most children these ideals when implanted arise from the love they bear to their mother. "Don't do that." "Why?" "Because I don't want you to," is with some children a sufficient reason—a reason which derives its cogency from the love that a child bears its mother. With others it must be reinforced by a whipping. But there are children in whom the real motive is traceable back to the persuasion of a mother who has promised

not to whip and who they know will keep her word. Those who think that the fear of the whip is the only factor in moral development have too simple a concept of the child mind. Those on the other hand, who think the fear of the whip is a factor which should be excluded from the moral discipline of youth, have too profound a trust in the essential goodness of human nature. It is a factor which should be given its place with all due judgment and discretion in the array of forces which attempt to restrain and direct the blind rush of the sensory impulses to be satisfied at all costs and without regard to the peace and pleasure of others.

The sources of the development of moral ideas in children are far more numerous than some might suppose. We have as yet very little exact empirical information on the matter, and are left very largely to judgments based upon our own more or less unanalyzed experience. Judging by the appeal we so often hear mothers make to their children (that the child hurts the mother in its rough play, "mother wants you to do this," "don't do this because mother does not want it," etc.), one of the earliest and most well drilled of juvenile moral principles must be: "It is wrong to do what your parents do not like." When the child grows a little older this principle is reinforced by the religious one, "It is wrong to do what God forbids," and children are told that God forbids them to disobey their parents. Both principles have their sanctions: The rod and the fear of eternal punishment. But the fear of punishment is not the sole spring of action in the child's mind. He is neither so base as to do what he is told purely from the fear of the rod, nor so noble that the love of his parents and respect for divine law is always sufficient to keep him from doing wrong.

Children differ in the relative degree in which they are influenced by law and its sanctions. There are some who may be described as morally dull. As a rule, this moral dulness is associated with a pronounced degree of intellectual defect. Rare cases will be found in which the usual tests for intelligence will give normal values in children who nevertheless seem unresponsive to ordinary moral instruction. In these cases I suspect a

defect of emotional resonance which deprives them of the assistance that others have from sympathetic feelings. Some children on the other hand are so responsive to the nobler springs of action that they experience, at a very early age, conflicts, the bitterness of which is usually tasted only by those who have passed the age of puberty.

Children who live in good homes and have their own little treasure of trifles very soon acquire the concept of the right of ownership, a concept which is very necessary for them to act up to in the present state of human society. Healy in his little work on honesty attributes some few cases of stealing in children to the lack of formation of this idea in their minds, brought about by the fact that the children of the family owned their toys in common. Whatever parents may think of the ideal state of human society it might be well for them to bring their children up to meet conditions as they are.

Kline[1] found that a deeply rooted principle of juvenile ethics is the law that a gift cannot be taken back. I think that the experience of most will corroborate his findings. This principle of juvenile ethics may have its roots in a wish-fulfilment, for the child receives much more often than it gives.

He also found that children from eight to eighteen are more likely to be altruistic than selfish. The principles of altruism are very early instilled into their minds in most good homes and this philosophy appeals to their sympathetic natures. In fact, sympathy for the unhappiness of others clouds their moral judgment. Kline found emotionalism rather than reason was often the dominating factor in their moral judgments.

A consideration of such facts as these will show us that with the advent of the power of understanding the spoken word and of assimilating the knowledge that may be communicated by language, the kinetic mechanism of behavior in the child becomes very different from what it was in infancy. In infancy behavior

[1] "A Study in Juvenile Ethics," *The Pedagogical Seminary*, 1903, X, pp. 229-266. For an extensive study of the development of the moral principles of children, see Marie C. McGrath, Catholic University of America Studies in Psychology, *Psychological Monographs*, Vol. 32, No. 144, p. 190.

was directed by the unpleasant consequences of satisfaction sought in certain channels, and by the sheer impossibility of attainment. In childhood (and by this period I mean that which elapses from the acquisition of spoken language up to puberty), the limitation of conduct is not only brought about by unpleasantness and impossibility but also by a more or less complex, but still relatively simple, system of ideals of conduct.

This makes a conflict of an altogether different nature from that which exists in infancy. The infant wants its own way and cries when it cannot have it. But it soon learns that some things are out of the question and after crying for the impossible resigns itself to its fate. Or, if it catches a bee and is stung, it does not grasp for the next big bug that flies and buzzes about it. The child, on the other hand, besides knowing that it cannot, and fearing lest it should, feels that it ought not. A neglect of the sense of obligation in the psychology of childhood makes it impossible for us to duly appreciate its conflict. This is true, no matter what one may think of the validity of the sense of obligation that the child experiences. Valid or invalid it is a positive psychological factor in the child's life.

It is necessary to distinguish the inhibitory power of moral concepts from the impulses themselves. All impulses are native tendencies to make use of native abilities. All moral concepts are acquired and hence cannot be impulses. Because native, and therefore a part of man's inherited constitution, impulses cannot be eradicated. Moral concepts unfortunately are often supplanted by a philosophy which is more in harmony with the instinctive cravings of nature. Moral concepts instead, therefore, of being impulses are acquisitions of experience designed to render possible the control of impulsive action.

Moral concepts do not themselves control actions but simply inhibit impulses from flowing over into actions without the guidance and direction of reason. The tendency of impulsive action is to assume the spontaneity and promptness of a reflex. This would often be injurious to the individual in his relation to other members of society or to his own full rounded and perfect development. The moral idea inhibits an act which would otherwise

take place spontaneously and makes it possible for the individual to refrain from acting or to act with deliberation and conscious choice. This implies another kinetic power which prolongs the deliberation by maintaining the moral principle before the mind and finally acts, it may be, against the driving force of the impulses. The maintaining of the moral principles before the mind requires a distinct effort. This effort is certainly not that of impulsive activity—for impulsive activity is driving to action irrespective of moral ideals. It is not the mere tendency of ideas to recur by association. This tendency may have called up the moral concepts in the first place. When ideas come up in this fashion they do so apparently spontaneously and of their own accord. But in the moral conflict, principles are sometimes maintained before the mind with a distinct effort. This effort is one of the forms of voluntary action.

When the individual acts contrary to the drive of the impulses this often requires a tremendous expenditure of effort. This effort certainly is not the effort of the impulses. It is something which is in conflict with them and is now triumphing over them. It is certainly not a purely intellectual something. It cannot, therefore, be the moral concepts. Here again we recognize voluntary effort in one of its many manifestations.

The characteristic, then, which distinguishes the conflict of the child from that of the infant is the appearance of an internal conflict. The infant has no conflict with himself. He is unable to question his own impulses. He follows where they lead, stopping only when one impulse inhibits another, as for instance, when fear restrains curiosity. The child has also an internal conflict. He does question his own impulses. Moral concepts have been instilled into his mind that have given him ideals of conduct and a sense of obligation that he must conform to them. His impulses often drive him to courses of action that conflict with his ideals of conduct and hence arises a conflict which was unknown in infancy.

The rise of the moral conflict does not mean that the conflict with reality ceases. Far from it. The child still drives on in its attempt to dominate, just as the infant did. When, for example,

the time comes to go to school it frequently resents giving up forever those happy days in which it had nothing to do but follow without restraint the impulses of sensory curiosity in its play. At this time we are likely to meet with the first elements of the psychosis. As soon as the child learns that ailments form an honorable excuse for the non-performance of unpleasant duties, it strives against doing what it does not want to do by magnifying its petty ills. It imagines, too, some complaint it does not have, and so, safeguarding its conscience tries to escape from what it finds distasteful. I shall cite several instances of this in discussing the parataxes of defense. In such conflicts with reality rather than in purely internal mental warfare the child has its bitterest battles.

When we compare the conflicts of childhood that are waged on moral grounds between impulse and will with those that take place after puberty they seem to be very trivial affairs. From the child's point of view they have called forth enormous effort, but in reality there was no great expenditure of voluntary energy. For the child's will is weak just as his muscles are puny and his memory feeble and all his abilities far inferior to those of an adult. We have as yet no means of measuring strength of will in adult or child. We have measured some of the child's abilities, such as memory. Whereas the popular notion is that the child's memory is much better than the adult's, experiment shows it is much weaker. All experiments made so far lead us to believe that children's mental abilities as well as their muscular strength are inferior to those of the adult. It is likely, therefore, that voluntary control in the child, just as all other abilities in children, is weaker than it is in the adult. Some direct evidence that a child's will is weak may be found in the fact that when sexual development takes place prematurely it is very likely to be indulged without restraint. The voluntary control of a child of eleven or twelve is wholly unequal to the difficulties and temptations of a mature man or woman.

As to the nature of the moral conflicts of children, they usually concern such things as lying, stealing, fighting, disobedience, using bad language. Sexual difficulties, in the strict

sense, do not exist in childhood, except in a few exceptional cases of mistreatment. Few children make a bitter fight to maintain their moral ideals against the insidiousness of these temptations. At most they make a few sporadic efforts at the instigation of others who happen to take a special interest in their moral welfare.

The Conflict after Puberty.—The advent of puberty does not do away with the desire to keep the senses active and the body moving—any more than did the acquisition of speech. The keen delight that the young find in games is in part essentially the same pleasure that they found in infancy in kicking and squirming, and rolling and crawling. The exercise of any function or ability is in itself pleasurable and under circumstances, keenly so. The enjoyment of a trip to the country by a city boy is due to a large extent, to the pleasure that is experienced in the healthy satisfaction of the curiosity of the senses. And (on the contrary) the lure of the town to the country boy or girl is at first based upon the curiosity of the senses—to hear and see things they have read about but never taken in with their own ears and eyes.

The interest in moving pictures is in part identical with that of the infant just old enough to sit up, who keeps his wide eyes in constant motion looking here and there and uttering, at times, its cooings of delight.

With the development of mental faculties comes a deeper appreciation of the difference between the world of fiction and the world of reality. The child is impatient to become a man and quit reading about things and see them for himself. Here again we often have at first nothing but pure sensory curiosity, the desire to actually experience the things that have been read about or seen, as yet, only in the moving pictures. This desire is at the root of much truancy and running away from home.

Though, later on, sensory curiosity becomes associated with complex instinctive activities, one will be mistaken if he presumes that some of the early escapades of children are sexually motivated in the strict sense of the word. By the strict sense is here understood the craving for the specific pleasure that arises from all forms of *rapprochement* between the sexes. This pleasure is

distinctly the acquisition of puberty and does not exist long before its onset.

The following escapade looks at first sight as if it had its roots in sexuality.

A young girl had become at thirteen a "movie addict." She stayed out late at night to see the motion pictures and no persuasion nor punishment could break her of the habit. She had a good home so that the root of her difficulty did not lie, as it so often does, in the lack of a suitable place to spend the evenings. She went to see a series of films, the main motif in which was the adventures of a girl running away from home. She became possessed with a desire to imitate this girl, and experience for herself some of the adventures of life. Her first attempt was to go to the house of another little girl under the pretence that she had permission to pay her a visit.

When her deceit was discovered she was sent home. She next met with a young man and one morning they went off together. During the day he proposed marriage. Lying about her age, they obtained a license and were married in a neighboring town. The next morning she was found by a detective, whom her mother had sent after her; she and the young man were arrested.

Mental examination showed a girl of borderline intelligence approaching closely the moron level. At the time of her marriage she knew nothing whatsoever about child-birth and had no conception of marital functions. She was very much shocked and frightened by her experience and welcomed her arrest as an escape from a painful situation that had not been anticipated.

One cannot be sure, in a case studied as superficially as this, that there was not present an unconscious sexual drive. It is always possible to imagine the presence of unconscious factors that further analysis would reveal. Nor will any depth of analysis be sufficient to satisfy one who is inclined to postulate their presence. Students of human nature are inclined just now to magnify the extent of unconscious influences as much as a little while ago, psychiatrists tended to minimize them or neglect them altogether.

One need postulate no more in this case than the drive of sensory curiosity to experience adventures that had been seen in pictures. The escapade with the young man meant little more in this child's imagination when she started out with him on the morning of their marriage, than the incident that had just been ended at the house of her girl friend.

Association of Sensory Curiosity with Other Interests.—When the age of puberty arrives sensory curiosity does not long exert an isolated influence. Prior to this period sexual matters may have awakened a peculiarly lively curiosity—but mainly because they were shrouded in so much mystery and encased in all manner of prohibitions. With puberty, a distinctly new coloring manifests its first blush, and sensory curiosity becomes more or less rapidly complicated by sexual curiosity. Motor activity and the mere exercise of the senses for their own sake become relatively tame and tiresome. Tops, marbles, jumping ropes, roller skates lose much of their former zest. Talks, walks, dances have an attraction never before experienced. A new interest is manifested in personal appearance. Novels are much more highly appreciated.

At the same time, other instincts arise and old ones change their form. The herd instinct of the child is more likely to find its outlet in marauding gangs that are recruited from boys who have not yet attained the full development of puberty. Sheldon's study[2] of predatory gangs of boys showed a maximum at eleven years of age. Their diminution after that age is due to absorption by athletic societies. Gangs that persist and are made up of young men that have passed puberty bear an altogether different character from those of children. They are maintained by contact with professional criminals and what used to be play has become a profession. The herd instinct after puberty manifests itself normally only when ulterior purposes hold together societies and organizations. Athletics, literature, art, music, politics become the bonds of interest.

Some few gangs are held together by a kind of loose organization for the purpose of frequenting dance halls. In those, the

[2] *Am. J Psychol.*, 1898, IX, 425–448, *Fide* Hall, *Adolescence.*

factor complicating the herd instinct is sexual. But, as a rule, the herd instinct of childhood becomes modified in puberty not by sexual, but by other types of interest. These interests usually have to do with some form of intellectual pursuit after athletics has held its temporary sway.

The tendency to heap up and acquire greater and greater possessions is a fairly well-defined human craving. In children it manifests itself in a passion for collecting. As measured by the number of things collected it reaches its maximum at ten. In adolescence it remains as a mere vestige of its former self. The probable reason for this is that increase in years gives a deeper insight into the problems of life and the craving is directed to practical channels. For, whereas the tendency to collect articles of no practical value decreases with puberty, the tendency to save money increases.[3]

This association of interests must of necessity intensify the appeal which life makes to the mind of the child. He becomes much more difficult to manage. A whipping may be an effectual and permanent set-back to mere sensory curiosity. But in the more complex drives after puberty it may be wholly without effect. Habitual truants, for example, when the motive is homosexuality or mere fellowship in the gang, may be whipped most unmercifully without its effecting the least change in their conduct.

Opposing Forces in the Conflict.—So far we have been speaking of the sensory drive and its complication by instinctive activities that mature at puberty. This is one side of the conflict. Its intensity usually lies concealed completely from our view. Occasionally when a boy or girl has been checked in his or her unsocial career and taken to a college or an institution, the violence of the reaction, the hysterical tantrums, the negativistic spells with refusal of food, the days of pouting and sullenness reveal to us the intensity with which he has desired to have his own way.

[3] "The Collecting Instinct," Caroline F. Burke, *Ped. Sem.*, 1900, VII, pp. 179–207, *Fide* Hall, *Adolescence*, p. 484. "Money Sense of Children," Will. S. Monroe, *Ped. Sem.*, 1890, VI, p. 152, *Fide* Hall, *Adolescence*, p. 393.

To want to have one's own way is not a pathological sign. It belongs to us by inherent right. At the same time, it is necessary that our inherent egoism be brought under control. Existence in the social order in multifarious relations to other human beings makes this necessary. From the social order arises the first opposition to the egoism of the individual and a conflict which is the psychogenic source of every psychoneurosis.

The first element of the social order with which the individual's egoism comes in contact is the family. It is the function of the family to prescribe limits to personal selfishness. It very often fails in this task because of the selfishness and unreasonableness of the members that compose it. It is very seldom that a father has an insight into the mind of a child and its difficulties. It is all too often that he is cruel in his unreasonableness. I remember a child of eight who was brought to the clinic for truancy. His back was all striped with broad, livid lashes left by a recent beating his father had given him with a razor strop. When asked what was the matter with his back he tried to cover up the real cause by saying that he had been leaning up against some chestnut burrs. Many a mother knows besides the lash only one other means of dealing with the delinquency of a child, and that is her angry tongue.

By the time of adolescence, school companions by fighting and making fun have usually contributed their full share to the training of the child. Many a boy and girl has paid up bitterly on entering school for the freedom from restraint enjoyed in the lap of a short-sighted and indulgent mother. High school and college continue to do battle with selfishness and arrogance and overweening pride.

And then there is the court with the police and its institutions of confinement. Only in recent times has a glimmer of psychological insight penetrated into the custodians of the law.

With these forces, the selfishness of youth comes into conflict in the perseveration of its infantile drive to dominate without regard to the rights of others or its own best interests. This conflict is made all the more bitter and unfruitful because, as a rule, restraint by whipping or scolding or imprisonment

exhausts the methods of authority. The mind of man is like flowing water. If one outlet is dammed up, another must be opened or there will be an overflow somewhere. You cannot restrain human activity by damming. You must provide an outlet. If you are not satisfied with what a young person is doing you must look out for something else for him to do. The adolescent must not be made to contend merely with parental temper and pious advice. Whether in the family or in the institution every outlet possible must be given for his energies. Athletics must be systematically encouraged. An attempt must be made to find out what interests he has along normal vocational lines, and a psychological study made of his abilities, that these interests may be rationally guided. Besides this we can, by instruction, awaken interests that are not present, by visits to factories and business establishments, and by directing a systematic investigation of the careers that are feasible.

Reasonable direction and not conflict should characterize the relation between the adolescent and society.

Besides these external forces, determining an outer conflict with society, there develops little by little an inner conflict with the problems of the mind, a conflict which centres in human egoism and the self-ideal.

Concept of the Self-ideal.—By the self-ideal is understood here a concept that has two elements. It is one's own private, personal opinion of himself, (a) of his present abilities, and (b) what he hopes to attain. It varies enormously with the intelligence of the individual. It has no existence in the idiot, little or none in the imbecile, but is definitely present in the moron, who often overestimates himself and what he can do.

In those schooled in the doctrine of a humble estimation of oneself, a large part of the self-ideal gets into the subconscious. It is wrong to be proud, is the central doctrine of humility. Humility, however, is perfectly compatible with a just estimate of what one can and what one cannot do. But many make the mistake of never allowing themselves to think of their own abilities and crowd out of mind everything that resembles self-complacency. The result of this is that they store up a great deal

of subconscious pride. Their professions of inability are simply defense reactions against the discovery of their pride. They are easily angered though if anyone makes a slighting remark about their ability. This is a "complex indicator." One who is humbly conscious of his disability may be grieved, but he is not angered if others make remarks about it. The deaf man gets angry if others tell him he cannot hear, because he does not want to realize how deaf he is.

So extensive is the system of defense reactions against the realization of our own defects that it would take quite a great deal of analysis for most people to find out what they really think of themselves.

There are two estimates that every man makes of his own abilities. One expresses what he would like to be; the other, what he fears that he really is. It is interesting to watch them fluctuate in moody souls, and still more interesting to try to find out the reasons for the fluctuations in ourselves. A transitory success, often in something of a trivial nature, sends us soaring in our own personal estimation. But a momentary display of weakness or ignorance, which perhaps is made light of, or passes unnoticed by others, brings on a tremendous bear movement in our stock market—a veritable panic as we are brought face to face with the fact that we are not at all what we want to be and still pretend that we are.

There are tremendous individual differences in the ease with which these bear and bull movements are brought on in the stock market of self-estimation. With some, their personal self-esteem is so hedged in with a system of defense reactions that nothing seems capable of disturbing it. Their ignorant blunders, imperfections, sins, are promptly excused and all blame shifted on to the shoulders of others. Murmurings of a self-accusation are promptly suppressed and securely confined in the dungeons of the subconscious. With others, the least shadow of failure or disappointment brings on a depression, deprives them of all self-confidence, robs them of energy, and takes away their desire and hope to do and accomplish.

The reason for this individual difference is worthy of careful investigation. But, whatever the cause, we must realize that everyone both overestimates and underestimates himself. The overestimation tends to stay at the conscious level, the underestimation, because of its unfavorable character, is readily repressed to the depths of the unconscious.

Significance of the Self-ideal.—One cannot separate one's estimate of himself from what he wants to be, for the idea that we have of ourselves is an ideomotor concept. We conceive an ideal of ourselves and this conception carries with it a tendency towards its own realization. The actual living out of the personal ideal is often a very difficult matter. We cannot be what we want to be because external factors are often necessary for the realization of the self-ideal. But external reality is not the only hindrance to our self-development. We cannot be what we want to be because the self-ideal contains incompatibilities, because we want two or more things that are mutually exclusive. These internal incompatibilities, as well as desire and its external hindrances, are the sources of life's severest conflict, a conflict which lies at the root of the mental breakdown.

The self-ideal itself is modified by the conflict. For defeat shows us that there are lines of development that for us at least are impracticable or impossible. It closes channels of instinctive outlet which our opportunities and abilities do not give us the power to keep open. Some, instead of accepting the situation as it is, blind themselves to reality and dream that they are what they only wish to be. These are proud and vain pretenders whom the world recognizes as such, but who have no insight into their own disability. Others, unable to accept the situation as it is, unable to compensate by dreams, unable to find an outlet in any other channel, react to an intolerable situation by some one of the many types of a mental breakdown. At the root of every mental breakdown—every parataxis, every psychoneurosis, every psychosis—is the conflict over the realization of the self-ideal. The understanding of this ideal is, therefore, one of the most important of psychological problems.

Factors That Determine the Self-ideal.—1. *Accidents of the environment.* Among the accidents of the environment, one of the first that influences the individual is parental example. A child's idea of himself and his future life is often built upon parental example. From parental example children turn to their teacher, and to a greater or less degree they are influenced by everyone with whom they come in personal contact. It should be noted that the external ideal of what one aims at has a psychological tendency to be transformed into the more or less subconscious idea of what one is by the alchemy of wish-fulfilment. There are common factors, therefore, in the production of self-esteem and the self-ideal. The ideals of history also have their influence, an influence more marked at puberty and more evident in girls than in boys.[4]

Personal persuasion by word, when reinforced by the ties of friendship, has a powerful influence on determining just what the boy or girl wants to be in moral, economical, social, and political life. The influence of sermons, lectures, books, is also a factor, but secondary to the personal influence of example and verbal appeal. It would be hard for one to estimate the influence of his reading on the character of his career—harder still to pick out what he owes to sermons and lectures. Individually these factors usually count for but little; collectively, they form a powerful force in the development of the self-ideal.

From reading, lectures, and sermons the adolescent acquires to a large extent his religious, moral, æsthetic and social ideals. These open the way to sublimations that enable him to bear with peace and resignation the burdens and sorrows of life. At the same time, they are the source of his bitterest conflicts. Religion, morality, æsthetics and the social order not only point out a path, but insist that it be followed. God and Eternity, the natural principles of right, the beauty of virtue and truth, the demands of the social order are systems of thought and conduct, which once known and appreciated do not allow themselves to be forsaken without a protest. One must abide by their counsels continually,

[4] Barnes, "Children's Ideals," *Ped. Sem.*, 1900, VII, pp. 3–12, *Fide* Hall, *Adolescence*, II, 387.

and every departure is, to him who has once understood, a source of keenest sorrow. In better natures the struggle between one's lower and higher self is sometimes of far greater moment and fraught with far wider possibilities of keen suffering than the conflict which might result between any desire and the merely physical forces that delay or block its fulfilment.

2. *Hereditary abilities.* Given general mental ability, a number of careers are equally possible. Some, however, require special abilities or a peculiar combination of traits if they are to be pursued with success. Thus, for instance, a man who cannot distinguish any difference in pitch between two tones in the region of middle C that are thirty vibrations apart cannot become a great violinist no matter how much he may try, nor the leader of an orchestra, nor a great composer. A man who *cannot overcome* his timidity and shyness may make a successful lawyer if he confines himself to the preparation of cases; but if he wants to be a great criminal lawyer and stand and plead before a jury, no matter how much he may desire it, his attempt along this line will probably be a dismal failure.

Along with the accidents of environment, hereditary abilities are factors in determining not only what we are, and what we want to be, but also what we think we are. Success pleases and satisfies; failure causes chagrin and discontent. A man feels out a place for himself in the world. He will not fit in every pocket. If he is in a bad hole, he wants to get out. He builds up other ideals for himself. If he is succeeding he attributes it to his own ability, he magnifies his self-importance, he desires a greater and ever greater success and exerts himself to the utmost to achieve it.

3. *Organ-inferiority.* Alfred Adler[5] has developed the idea that the choice of a career depends not upon one's native abilities, but upon some hereditary disability. This disability is due to some inferior organ whose inferiority is transmitted by heredity. When an organ is inferior, more work is thrown upon it and it

[5] See his two works: *Studie über Minderwertigkeit von Organen,* Berlin and Wien, 1907, p. 92; *Über den nervösen Charakter,* Wiesbaden, 1912, p. 195. See also *infra,* p. 279 ff.

compensates for its disability either by hypertrophy or hyperfunction or both. An individual who has an inferior organ realizes more or less painfully his disability. This realization, according to Adler, gives rise to a feeling of inferiority which lowers his personal self-esteem. This conflicts with a tendency present in everyone to elevate his own personal self-estimation (Erhöhung des Persönlichkeitsgefühls). From this conflict arises an attempt to make good the inherited inferiority by over-exertion. The individual creates for himself an ideal end in which he excels in the very ability in which he is deficient, and his whole life becomes thenceforth an attempt to dominate in the very field of his disability. This reaction is termed by Adler the male protest (männlichen Protest).

Historical examples are pointed out by Adler in confirmation of this view, *e.g.*, the deafness of Beethoven, the stammering of Demosthenes.

There can be little doubt that organ-inferiority is sometimes a factor in the development of the self-ideal as well as inherited abilities. One attempts to make good his deficiency either because he is ashamed of it before others, or because length of life depends upon it. The childish reaction to anyone who says you cannot is to show him that you can. The very fact that others doubt your ability lends zest to the task of demonstrating it before them. If there is a natural defect that stands in anyone's way, all the more credit to him if he should succeed. A credit which in that case he will not fail to take to himself. If he fails, his organ-inferiority will be his consolation, for he will say to himself: "If I had only had the ability of others I would have succeeded as well and better than they."

One who has begun to make good a defect by over-exertion to cover up what he is ashamed of, or to take measures to see that his life will not be shortened any more than necessary, may become interested in some line of work and then pursue it not only because of its compensatory value to him, but also because it is attractive in itself. In such a case the choice of a career is determined by organ-inferiority, just as in other cases chance or friendly advice perform the same function.

Can we go further and say that the only determinant of the self-ideal is organ-inferiority, that our disabilities and not our abilities make us what we are? White seriously proposes this question in his *Mechanisms of Character Formation.*[6]

"What shall we say of this organ-inferiority as the basis of the conflict? Can it be true that all growth, all development comes from the expenditure of effort in trying to overcome some defect? In this sense all strength has its origin in weakness? And if so, should we not rather welcome suffering because only through trials that tax us to our limit can the full of our powers come to function."

Sweeping generalizations are usually found on careful examination to admit of many exceptions. Any attempt to make organ-inferiority the sole factor in the development of the self-ideal is bound to make shipwreck on the cold, hard facts of experience. It is one factor, but by no means the only one. When it acts it supposes two conditions at least:

(I) The organ-inferiority must not be such that hyperfunction is impossible.

(II) Organ-inferiority must coexist with general and special ability or there can be no adequate compensatory overactivity.

Thus, for instance, Beethoven with his deafness is pointed out as an example of one who by musical development made up for his deficiency of hearing. But, could Beethoven have made himself a great musician simply because he suffered from a slowly increasing deafness? There are many deaf people, but very few Beethovens. Beethoven's development was due to native ability rather than organ-inferiority. It is probable his deafness had little to do with his choice of his career as a musician. This was forced upon him by his father when he was as yet very young, and in all probability before he had experienced his organ-inferiority.

Organ-inferiority is a factor, but only a secondary one in the development of the self-ideal. It is like the catalyzer in a chemical reaction that accelerates it and makes the transformation take place in an appreciable amount. But, what good is a catalyzer

[6] New York, 1916, p. 278.

without its reacting chemicals, and what is the value of the manly protest in one who lacks the ability to back it up?

Conquest and Defeat.—Happiness and contentment are the result of working out a harmonious solution to the problems that arise from the conflicting elements of human impulse and desire. Success in an undertaking that one has set his heart upon accomplishing does not necessarily mean that a harmonious solution to the problems of life will be found. One might amass millions and be further from happiness and contentment than when he started out on his career. We have many impulses and many desires. Only when they are subordinated to some one thing that makes life really worth while, only then can we stand the trials and necessary repressions that our ideals and the accidents of life impose upon us.

Religion is the only sublimation that enables man to view time and eternity with *perfect* peace and content. Art, music, literature, philosophy, science, social work, have, as a matter of fact, often made life endurable to those who for one reason or another have failed to attain the peace and content that is the natural blessing of a happy home. Any of these things serve to make life relatively worth while, if, as Aristotle postulates, one is blessed with a certain amount of the goods of this life.

Purely natural happiness in this world may be obtained by directing one's efforts consistently and successfully to the establishment of a happy home-life, and safeguarding one's self against calamity by the development of a normal power of satisfaction in working for the welfare of others or in zeal for at least the enjoyment if not the advancement of art, music, literature, philosophy or science.

The man who is truly successful in the conflicts of life has many wholesome interests, all of which he subordinates to some one worthy end. If this end is religious, his happiness has a stability that neither death nor calamity has the power to shake.

The man who is overcome in the conflict fails because he does not find anything that makes life worth while. There are various results which arise from this defeat. One is the attempt to forget by the active pursuit of pleasures. Another is plain discon-

tent, sorrow, moodiness. A common type of failure is the cynic. There are two elements in the popular concept of cynicism. One is a sneering disbelief in the virtue and honesty of others. This always means that the cynic is bad himself and dislikes to think that anyone is better than he. The other is a contemptuous feeling of superiority. He is compensating for his consciousness of guilt. This feeling of superiority often takes the form of a sense of enlightenment. He knows more than the common rabble and his superior knowledge enables him to shake off the fetters of moral superstition by which the ignorant are bound.

Extending beyond the limits of the normal reactions are the parataxes, psychoneuroses, and psychoses. Since Adolph Meyer wrote his *Dynamic Interpretation of Dementia Præcox,* the tendency has grown ever stronger and stronger to regard that psychosis in particular as a mental reaction to the difficulties of life. The individual acknowledges his defeat and retires into the cell of his own personality. Life no longer has any possibilities for him and so he shrinks into his dream-life with himself. He has lost the battle and retreats from the scene of conflict.

The important lesson that the study of the conflict teaches us is that the undesirable human reactions are dependent on its outcome. The discontented grouch, the sarcastic, the cynical, the psychoneurotic and the demented are what they are because they have failed. They need not have become what they are. They have mismanaged their lives. They belong to those whom Dante refers to in his description of Hell as *le genti dolorose ch'hanno perduto il ben dell' intelletto* (*Inferno, Canto III,* 17-18). They must have guidance now and direction from one who knows better than they. If this is so, the psychologist who would come to their aid should not only understand their type of reaction, but should also be one who has not mismanaged his own life, and has not muddled his own affairs. That he may understand how to help them it is also necessary to know the various mechanisms of human readjustment. Let us, therefore, turn now to the study of mental adjustments.

CHAPTER IV

PSYCHOTAXES AND PARATAXES

The Name "Psychotaxis."—When a new name is proposed for scientific facts it should always be with great reluctance and after long deliberation. Some authors have made their works difficult reading by yielding too readily to the impulse to create a new terminology. It is, consequently, with great hesitancy that the name *psychotaxis* is proposed for the phenomena we are about to consider. It is hoped, however, that it will serve to unify a variety of facts which have much in common, and which, so far, have not yet been subsumed in any general schema of mental abilities. Many of these phenomena—the defense reaction, compensation, sublimation—were unknown to the older psychologists, or at least were not subjected to scientific psychological analysis. They are terms which came with psychoanalysis, a movement which arose independently of scientific psychology, and which still remains a separate trend of thought. Yet the two must be brought together and supplement each other by surveying a common field of interest from different points of view.

In choosing the term "psychotaxis," the attempt was made to make use of roots that are not wholly unfamiliar. We have already pointed out Verworn's use of the Greek τάξις instead of τρόπος to designate adjustments of animals to simple physical stimuli. Thus he speaks of phototaxis, thermotaxis, galvanotaxis, etc. But the term "tropism" was already in use, and there is no good reason for discarding it. In the present instance we wish a root to designate *the tendency of the mind to adjust itself to pleasant and unpleasant situations.* Though "taxis" suggests a passive arrangement rather than an active adjustment, those of us who have become familiar with its use to designate the movements of the protozoa will feel that no great violence is done if it is used to signify the mental adjustments of individuals to pleasant and unpleasant situations—especially since such reac-

tions often consist in a rearrangement of one's ideas in which some drop below consciousness and others appear on the surface.

The Application of the Term.—We have just considered motor impulses and sensory impulses. Are there no impulses connected with our emotional life other than the emotions themselves? Yes. For we have very strong innate tendencies to enjoy to the fullest all pleasant situations, and to get out of or avoid to the uttermost all unpleasant ones. The tendency to enjoy pleasant states of mind or to make use of pleasant emotions and feelings can without any great violence be subsumed under our definition of an impulse—the tendency to make use of a mental function. This tendency by analogy with the tropism or taxis could be termed a positive psychotaxis. The opposite tendency to avoid unpleasant situations is a negative psychotaxis. The great variety and richness of the psychotaxes is to be found in the negative class. To enjoy, one needs to do little more than let things take their course, or drive on in the pursuit of the pleasure that is in sight. But to avoid is a difficult and complex process and leads the mind into ways that are dark and devious.

Relation of Consciousness to the Psychotaxes.—To tend to avoid an unpleasant situation, to sink back into the ease and delight of a pleasant one, needs no conscious and voluntary effort. One may reinforce the tendency by conscious voluntary action, but it is not necessary. The tendencies are almost reflex in character. So true is this, that individuals are frequently unaware themselves of tendencies that are at work in their own mind. This tendency of the psychotaxes to unconscious levels is helped out by the fact that they are often unmanly makeshifts, which, if seen in their true light, would make the individual appear contemptible in his own eyes and in those of others. Thus, for instance, in the psychotaxis of avoidance by disabling mechanisms: A man's duty is unpleasant. He exaggerates a physical difficulty, and so becomes unable to perform his duty, and thus gets out of an unpleasant situation. These cases are very common. A careful study of them will seldom give the impression of pure malingering. The physical disabilities are sometimes such as can be produced by hypnosis, but are beyond voluntary

control. The man is not conscious that he is pretending. He wants to think, and have others think, that he would come up to the mark if he could. Consequently, the very thought that he is trying to avoid his duty is repulsive to him. He does not allow himself to dwell on it for a moment. He mechanically puts it out of his mind, and the whole disabling mechanism becomes unconscious. Some individuals have a kind of dark suspicion of what is going on in their own minds—especially those given to self-analysis; but others are so taken up with the idea of the purity of their motives and the innocence of their character, that they do not see what is perfectly apparent to the disinterested observer. In such cases our enemies often judge us better than our friends.

Again, it may happen, as in the compensations, that one is conscious of the satisfaction and happiness he gets out of certain pursuits, but does not know the precise reason why this particular activity is so pleasing to him. Thus, as we shall see, novel reading is a compensatory psychotaxis. Many people take indescribable pleasure in a certain story, because in reading it they live through pleasures that have never been theirs. But, if asked why they like it, they would never give this as the reason, though they might or might not realize it, were it pointed out to them.

In the psychotaxes, therefore, we have mechanisms that are partly conscious, partly unconscious, with all shades of transition between the two.

The Classification of the Psychotaxes.—We may, as we have indicated, distinguish positive and negative psychotaxes, just as we do the tropisms. The tendencies that we have to enjoy pleasant situations we may group under the name of "the persistent drive." They do not vary very much, though, eventually, they may become associated with very complex mental operations. The negative psychotaxes, on the other hand, are at first sight many and various. Most of them may, however, be brought under a few headings. The first class are psychotaxes that present no solution—not even an inadequate one—for the unpleasant situation. These are depression and anxiety. There is a natural

and innate tendency to be depressed, to worry and fret over unpleasant situations. But this does not get the difficulty out of the way. The second class embraces psychotaxes which involve some kind of solution for the difficulty, however inadequate. There are three possibilities here. The unhappy eventuality may in some manner be avoided. Tendencies which merely aim at avoiding unpleasant situations have been aptly termed *defense reactions*. Here we have a large group of reactions. One may put the unpleasant situation out of mind if it is a mental affair. One may *shut out* the world from contact with his mind, if surroundings are harsh and unpleasant, and become surly, cynical, sour, silent, secretive, negativistic. One may *become incapacitated* by general weakness or special disability, if his duties become very unpleasant, and there is any way of throwing the burden of self-support or family sustenance on relatives, friends, or the associated charities. One may *avoid* the *realization* of *personal blame* by an exalted sense of his own righteousness, and transfer it to others by suspicions and accusations. One may *keep others from realizing* his own real desires by a solemn face, or a violent, old-maid shock-reaction at the recountal of the sins of others. All these examples are instances of native human tendencies which appear spontaneously in anyone, given the proper circumstances, but not all appear with equal facility in all types of individuals.

Besides getting out of an unpleasant situation, one may seek to make up for its unpleasantness by some new form of enjoyment. If this is attempted along more or less the same level of satisfaction as the lost pleasure which creates the unpleasant situation, then the reaction is termed *compensation*. Thus, one may imagine the fulfilment of unsatisfied desire. One may compensate for an unhappy life by becoming a wit. One may go to a vaudeville show to drown his discontent. One may *transfer his affections* from one person to another. One may *appeal for sympathy*—sometimes by making himself appear sicker than he is—by convulsive seizures, etc. Some throw themselves against their enemy hoping for unjust severity that others may see how badly they are treated.

If, however, satisfaction is sought in pleasures of a higher nature, we speak of the reaction as *sublimation.* Thus, a woman disappointed in love may become a social worker, or give of her millions to build an orphan asylum, or become devoted to music, art, literature, etc. Music offers to certain natures channels of outlet when the ordinary interests and affections of life are denied them. So, also, literature, art and science. Religion is the natural sublimation of human desires, always possible and always effective, no matter how great the calamities that confront us.

Along with these natural tendencies to avoid unpleasant situations, to compensate for disappointments, to sublimate life's energies into higher channels, there is often an attempt to meet the situation squarely, ask oneself what can be done, and then actively repress certain tendencies and give scope and place to others. This rational readjustment and active repression is something quite different from an impulse. It is a directive power that is exercised over impulse. It is not a psychotaxis, but a voluntary effort that is made under the influence of intellectual insight and ideals of conduct.

Abnormal Emotional Adjustments or Parataxes.—The impulses to adjust oneself to difficulties that we have just classified are, in their general outlines, common to all human beings. All of us have a tendency to be depressed and anxious, to avoid unpleasant situations, to compensate for disappointments and sublimate our desires. Any of them, if carried to excess, may become abnormal and distinctly pathological. Thus, if depression deepens into absolute inactivity, if anxiety incapacitates one for ordinary duties, if the tendency to shrink into oneself passes into mutism and refusal of food, the adjustment is clearly abnormal. Some adjustments are essentially pathological—for example, to protest against a situation by a series of convulsive seizures, or to incapacitate oneself from duty by a paralyzed arm or leg. It should be noted that none of the reactions here referred to is purely voluntary sham or malingering. To make up one's mind to escape a difficulty by pretending some kind of a disability is not a psychotaxis—but a rational voluntary adjustment.

There are, however, a number of *functional* disabilities, that is, conditions that have no organic lesion or disease as a pathological foundation. These had best be conceived of as due to an unconscious pretence. They are often looked upon as hysterical symptoms. Just as there are all stages of transition between the conscious and the unconscious, so also there are between malingering and hysteria.

These abnormal adjustments are very common. They often exist as the sole or the main evidence of a pathological state. Thus, hysterical convulsive seizures may occur in a patient without any of the so-called permanent stigmata of hysteria—or an hysterical contraction without any other stigmata and without the convulsive seizures of the classical hysteria. This monosymptomatic hysteria is common in children and was a frequent form taken by the war neuroses. Many of these conditions seem far too simple, and clear up far too quickly and easily to be classified among the major psychoses, or even with the psychoneuroses. One might speak of them as abnormal psychotaxes. It seems best, however, to use a single word which will designate their abnormal character without the use of an adjective. The Greek preposition παρά may signify in composition something that is wrong or amiss. We are already familiar with it in *paraphrenia,* one of the synonyms for *dementia præcox.* The term *parataxis,* since its roots are not wholly unfamiliar, may serve as a fairly expressive designation of these abnormal reactions, even though it is already in use with a different signification (the opposite of syntaxis).

The Parataxes and the Psychoneuroses.—Reflex action, impulse, desire, and emotions are at times elements of complexes that we term instinctive reactions. Thus, in defending oneself against danger, there will be an emotion of fear, a desire to flee, impulses to strike, vasomotor reflexes along with the reflex secretion of adrenalin and its effects on the mobilization of sugar, the fuel for muscular action, on muscular tonus, etc. The whole operation of the instinct of self-preservation in this case is a very complex affair, some of the elements of which we have just been considering. Among these elements are the psychotaxes.

Now the parataxes may be considered as bearing a similiar relation to the psychoneuroses and the major psychoses. A soldier comes back from the front with the diagnosis, "shell-shock." There is nothing the matter with him except that his right arm is trembling in a gross, disorderly fashion, so that it cannot be used. With a few relaxation exercises the tremor disappears in a couple of minutes. He is sent to the ward and allowed a few days' rest. In a few conversations he is given a little insight into hysterical disabilities, and in a short time he is sent back to the front; and, *mirabile dictu,* makes good, stays, and does his duty. Has a case of hysteria been cured by such a simple procedure? Probably not, but only a condition which might develop into hysteria, becoming more and more complex in its ramifications into the individual's life, had it not been taken at its onset. What one was dealing with here was only one element in the hysterical group of reactions, a simple parataxis, and not a psychoneurosis.

Thus, the parataxes are elements of the psychoses and the psychoneuroses as the psychotaxes are elements of the instinctive reactions.

CHAPTER V

THE PARATAXIS OF DEPRESSION

Depression as an Impulse.—Depression is a form of sadness, and as such, a typical emotion and not an impulse. Emotions, however, in a perfectly normal mental life, are transient conditions. Calamities happen, but the unfortunate sufferer, after a period of sadness and loss of interest in everything, finds occupation and renewed zest in his work. The ability to recover from misfortune, to shake off sorrow, to arouse oneself from depression, varies in different individuals. In those who lack this ability we find not only its negation, but also a positive tendency to remain sad and nurse their sorrow. If one whom they love very much dies, a certain sense of fidelity to the departed seems to demand that new interests be shut out, and that they remain faithful to his memory by their continued sorrowing. Or, if they lose their money, or their position and station in life, or fail in some enterprise, they are not only sad, but seem to want to remain sad. Sadness procures a sympathy which is not bestowed upon the gay pretender who shakes off his sorrow and does not allow others to perceive that he suffers. Many have a keen craving for sympathy. Thus, a little girl once remarked to me: "Don't you think it's nice to be sick and have everybody be so sorry for you?" So, also with sorrow, many think it nice to look sad, and have their friends pet and comfort them, so they stay sad, and their friends help to keep them sad in the vain attempt to console them and to remove their sorrow by lavishly bestowing their tender caresses. The faint-hearted crave these manifestations of sympathy so much that they nurse their sorrow to obtain them. Thus, while sadness and depression are emotions, they are, nevertheless, associated at times with an impulse in virtue of which the individual tends to persevere in his sorrow.

It cannot be doubted that in some cases we find special mental factors, we might say extraneous conditions, such as a sense of

fidelity, or a craving for sympathy, that stimulate the tendency to be sad. We must not forget, however, that sadness itself, apart from extraneous mental considerations, has a kind of mechanism of self-preservation. It slows down the flow of thought. In pathological cases this slowing may be so great that conversation with the patient is a slow, tedious process, because of the time it takes him to answer simple questions. Reaction-time experiments show that the time of association of these patients is much lengthened. It is thus difficult for them to consider the various possibilities that lie open to them and to work out a rational solution for their difficulties. When someone else proposes such a solution, his words reach the auditory centre, but there their influence ends. Propose a trip, or a new occupation, or a course of study, to a normal youth and it at once awakens in his mind a whole panorama of imagery and vast vistas of possible achievement. But in the time of sorrow, associations flow so slowly that these possibilities do not occur, and even if one points them out, the sufferer cannot weld them into his scheme of interests. For that scheme of interests has been shattered by his sorrow. His centre of ambition is gone and his mind works too slowly to build a new one, and to plan for the future. Thus sorrow, by its natural effects on the mind, produces a tendency to remain sad. This tendency is usually reinforced by extraneous factors, such as a sense of obligation to remain sad in order to show one's fidelity to a soul departed, or to a lost cause, or from an innate craving for sympathy. This impulse tending to perpetuate the emotion of sorrow must be distinguished from the depression which it fosters. It is a common type of reaction to the difficulties of life, presenting, however, no solution for them whatsoever and, therefore, demanding modification and control.

The Stages of Depression.—It would be wrong to look upon every tendency to maintain a state of sorrow as pathological. Sadness procures sympathy, and sympathy, perhaps, has a valuable function to perform. It results in mutual help and is one of the stimuli to altruism which is a very useful acquisition of the human race. Few would be willing to banish all sorrow and all sympathy from a world such as ours in which misfortune is

a daily occurrence. And perhaps it is a good thing after all to slow down for a time the torrent of human thought which so often rushes headlong and heedlessly through channels and courses over which reason exercises no control. To stop and think, and make a rational plan of one's life is a consummation that is often obtained only as the result of misfortune and the time it gives to pause and consider. Because of this useful and purposive character we may look upon many tendencies to remain sad as normal impulses. These normal tendencies are the psychotaxes of depression. Between them and the depressive form of the manic-depressive psychosis there are a number of conditions which block the individual's activities and are injurious to his normal mental development. They are, therefore, to be considered as distinctly pathological. On the other hand, they clear up so readily under simple mental treatment, that they should be distinguished from the psychosis of depression which runs its course wholly unaffected by any psychotherapy whatsoever.

In my experience with depressed conditions, psychotaxis, parataxis, and psychosis shade into each other without any clear line of demarcation. If this be the case, the psychosis of depression is only an outgrowth of a normal human impulse.

Let us consider now some of these transitional conditions:

The Parataxis of Depression: Examples

A situation rather than an incident is at times the apparent cause of a depression. Thus, a woman of forty-six became depressed when her husband was put on night work. The depression, however, did not arise from sympathy with him over the hardship he had to put up with. The result of his night work was that he was around the house a great deal during the day. He was nagging, irritable, subject to explosive outbursts of anger, was harsh and cruel to their boy, and made life unhappy for the little fellow. She had had two previous periods of depression. In the first she spent four months in an asylum. The second lasted for six months, but she was not sent to an institution. This, her third depression, did not come to full development. It cleared up in the course of about two weeks. The factors in the

treatment were so simple, and the cure so rapid, that we can be sure that we were not dealing in this case with a major psychosis, but only the innate trend to be sad and depressed, and perhaps nurse her sorrow in an unpleasant situation in which she felt that she was unkindly and unjustly treated. A reaction type such as this raises the question: Is the parataxis of depression the root of the manic-depressive psychosis? In this case, where the woman had two previous attacks, in one of which she had to be sent to an asylum, it seems very likely that the incipient symptoms of the third attack might easily have developed into a major psychosis.

The elements of treatment in this case were:

(a) Reasoning her into a more rational attitude towards her husband's outbursts of temper. This, by the way, resulted not only in helping her, but also in quieting her husband.

(b) Allowing her to follow her impulse of adopting a small child from an infant asylum.

(c) Stimulating her propensity to find consolation in religious exercises.

Except for minor spells of sadness, there was no relapse in over five years during which the case has been followed.

When one human being centres his affection on another, and anything occurs to disturb the relationship between them, the inevitable result is a depression. How deep the depression is going to be depends on the ability of the depressed patient to find other centres of interest and affection. A woman of thirty-one came to the clinic complaining that for about eight months past she had been suffering with abnormal sadness. At times it was so heavy that it seemed that something was smothering her, that the outlook for the future was absolutely hopeless, etc. Her mind was a blank. Her sadness seemed unreasonable to her. She had the typical sad and anxious expression of the depressed patient. With treatment, the whole condition cleared up completely in about a month. She was seen some months later, very happy and cheerful, an altogether different type of woman from the sad,

worried patient who came to the clinic. The treatment consisted in the following elements:

(a) Seeking the cause of her depression. This was found from its history. It commenced about the time the man to whom she was engaged became indifferent and ceased calling upon her.

(b) Dream analysis: This showed that the man to whom she was engaged was not her ideal, but another man to whom she was not engaged. Thus, it was possible to argue that the outlook was not so black because the man to whom she was engaged had left her. It was really a fortunate incident. She must seek her ideal elsewhere, and it should be possible to find it.

(c) Being an educated woman, it was possible to offer her some outlet in reading and study.

(d) The outlet of religion was in her case readily utilized, and of no little assistance.

A past delinquency sometimes acts as a mental boomerang and intensifies or perhaps produces, by association, a parataxic depression.

A woman of forty came to the clinic complaining of sadness that had lasted without interruption for about seven months. Her behavior and talk were normal, her face sad, but not so much so as to exclude occasional smiles. About five months previous to what she regarded as the onset of her depression, her six-year-old child died of pneumonia. This made her sad, but she did not commence to lose interest in things for about five months. Then she became inefficient in her household work and unable to care for the children. She felt that the family must move back into the neighborhood they had left when her child died. This was done at no little sacrifice and expense. After only a few days in the old environment, she broke down completely and was unable to do anything.

An attempt to discover mental factors by the Freudian method of free association led finally to the following complex: She expressed a fear that she was being punished. When asked why, she told us that when she was about twenty she broke up the

happiness of a young couple who were about to be married, by getting the man to court her. She cared very little for him, but her vanity was touched by his attentions, and she took delight in triumphing over her rival. Their marriage did not take place and she soon dropped her foolish admirer. Now she feels an irresistible impulse to break up her own home and go elsewhere. "My children's affections are turned away from me. They love their father rather than myself. They love other children, but they don't love me. I have lost the affection of those I love. I want to take my children away from their father and away from all other children that they may turn to me."

After this outburst, she expressed great regret for having told me her history, wanted to destroy the record, left the clinic and did not return again.

In the cases just mentioned we have conditions that approach the psychoses; the last one was perhaps a real psychosis in which there was an active etiological mental factor. Had it not been for the memory of her past delinquency, and the idea that her affliction was its punishment, she might have borne the loss of her child without becoming so depressed as to be unfit for work, and without the natural tendency of a mother to be jealous of the love between father and child becoming pathologically accentuated. In all these cases the constitutional factor which slows down the flow of thought in sorrow and produces a tendency to brood over one's misfortunes, was perhaps more active than the sense of fidelity or appeal for sympathy above mentioned. These factors are especially prominent in depressions following the death of near relatives. The content of the patient's thought will at times reveal their presence. Thus, a woman, who for months after her husband's death was very much depressed, frequently expressed the opinion that the marriage legislation of the Catholic church should be reformed so as to forbid the crime of second marriages. The feeling that she must be faithful to her husband's memory was active in her mind, and was, in part, responsible for her depression. The depression was an outward sign of her fidelity. Lest some psychoanalyst would attribute her horror of remarriage to a subconscious desire to marry some-

one else, it may be stated that nothing in this patient's history suggested any real foundation for this hypothesis, and she lived in widowhood for over fifteen years without remarrying.

The Etiology of the Depressions.—Whereas, any unpleasant event may produce a feeling of sadness, not every incident can call forth the tendency to remain sad. The incident must be one that affects profoundly the individual's hierarchy of desires. It renders him for the time being hopeless, so that he feels sorry for himself, feels that others should pity him, has no longer anything on which to build, for the keystone in the arch of his desires has been knocked to the ground. Thus, the situation in which he finds himself is impossible. If he does not change, and he does not find new interests, the psychotaxis takes on abnormal features leading to unreasonable persistence in the signs of grief, becomes a parataxis, or may even deepen into the psychosis with its accompanying utter incapacitation for the round of daily duties.

That an abnormal reaction occurs in some men, and not in others, depends to a large extent upon their inherited constitution. Patients suffering from manic-depressive psychosis have more insane relatives than normal individuals, and these insane relatives are frequently of the manic-depressive type. It is interesting to note also that the manic-depressive cases are, to a large extent, recruited from those who take to the Bohemian type of society, as artists, musicians, poets, etc. There is, therefore, in every depression an hereditary organic factor which makes the patient physically disposed to this type of reaction. We have no knowledge of the more intimate nature of this psychophysical disposition. We have a right to assume some kind of physical factor, because it is hereditary and must, therefore, be transmitted by the germ cells, and, in all probability, by some one chromosome of these germ cells. We know, too, that a tendency to emotional reaction may come and go with a physical condition. Shakespeare speaks of sleep that "knits up the raveled sleave of care." Most of us have experienced the truth of his insight into human nature. When tired and worn out, all outlook on life seems possible only through glasses that are as blue as indigo.

But after rest and sleep, one rises with a new view of the world. Sadness and depression have vanished. If this is the case, it would seem that fatigue products are capable of influencing our mood, and, if so, why should there not be a physical factor in our tendency to sadness and depression?

In every depression there are, then, two factors. One is the native disposition, an hereditary, physical, organic condition; the other is the psychical factor consisting of the incident, and the patient's hierarchy of desires. There are cases in which one or the other of these factors dominates almost to the exclusion of the other. The hereditary factor is at times so pronounced that some patients spend the greater part of their life in a profound depression for which no adequate psychological cause can be found. In some, every spell of sadness has its mental motivation. When no mental factor is found we have no right to argue that it is absent. Depressed patients are peculiarly reticent. Nor can we argue from the suddenness of the onset or cessation of a depression, that it must be without any mental factor. Depressions are said to come at times like a stroke of lightning without any apparent cause. I have had few opportunities of examining such cases, but it is within the realm of possibility that repressed trends of discontent suddenly manifest their power in virtue of associations with apparently trivial incidents or perceptions that seem indifferent. Such unnoticed perceptions are at times the starting point of apparently unmotivated trends of thought.[1]

That any individual falls into a depression depends upon his inherited constitution and the strain to which it is subjected. Most of our soldiers, for example, went through the war with no more than the ordinary periods of blues to which all men are subject. One poor private fell into a profound depression with suicidal tendencies when, separated from his organization, he got among complete strangers in the mud and rain of sunny France.

Treatment of Depression. The prophylactic treatment of depression should strike first at the hereditary factor. Persons

[1] Cf. Kiesow's work on *Freisteigende Vorstellungen* in the *Archiv. für d. ges. Psychol.*, 1906.

belonging to a family in which a manic-depressive psychosis has made its appearance should not marry into a similar family. To forbid their marrying at all would, I think, carry practice beyond the authorization of well-established theory. It is not certain that this hereditary defect cannot be weeded out by continuous intermarriage with stable mental stock. The defect is recessive and not dominant, and as long as such families marry into stable ones the children will have ordinarily stable constitutions. The next prophylactic measure is to provide the individual by education with a foundation for multiple interests in life. The pursuit of knowledge for its own sake, of literature, science, music, art, can give a great deal of satisfaction and happiness. The uneducated who suffer from some calamity after passing the prime of life have little to compensate them for their loss and look forward to nothing but a colorless and lonely future.

Once a depression has occurred, the earlier it is studied by a competent psychiatrist, the better. In the cases cited, some suggestions for treatment have been given. One must try first of all to find the true cause of the depression and then open compensatory lines of activity, and assist the patient to adopt a more reasonable attitude toward his difficulties, by analysis, reason, and persuasion.

CHAPTER VI

THE PARATAXIS OF ANXIETY

Anxiety as an Impulse.—Anxiety, like depression, is a word which is usually regarded as referring to an emotion. As an emotion it is something very much akin to fear. Popular usage seems to speak of fear when one anticipates bodily harm in the actual presence of danger, but when one is uneasy about some mental ill, or a physical ill which may sometime happen, but does not now impend, the term "anxiety" is often used. Again, the word "anxiety" is used interchangeably with fear, or at least with fear of moderate intensity.

With the feeling of apprehension there is associated a definite tendency which serves to perpetuate the emotion. This is *the tendency to bring up again and again to the mind the anticipated evil.* A state of anxiety consists in the ever-recurring activity of this tendency, and its inevitable result, an emotion of fear. Along with this tendency to picture the anticipated evil there are motor tendencies, often unreasonable, and wholly inadequate to bring about a solution of the difficulty. This fretful activity is the characteristic associate of anxiety.

When, therefore, we speak of a psychotaxis of anxiety we are referring, not to an emotion, but to a fairly common impulsive type of reaction to an unpleasant situation. This consists mainly in an impulse to consider over and over again unpleasant possibilities.

The Stages of Anxiety.—To be worried about a situation likely to be fraught with dangerous or unpleasant results, to have a tendency to consider this possibility repeatedly is, within limits, a normal and useful reaction—a healthy psychotaxis. It makes for a wise and careful management of our life. If we did not consider again and again the possibility of mistakes, errors, misfortunes, we would rush heedlessly into danger and fail to shield our lives from harm. It is an ability that must be exercised prior to the solution of the problems that confront us, and there

is a strong innate tendency to do so. When, however, no entirely satisfactory solution appears, certain types of individuals keep on going over and over again the possibility that the worst will some day come true—or perhaps that it is even now happening without their knowledge. Thus, when a man is guilty of some habitual delinquency, he fears that he will be discovered. He does not want to give up the delinquency; but on the other hand, he does not want anyone to suspect him. The rational solution would be to give up the bad habit, but he is caught in its meshes and feels powerless. The possibility of the misfortune of being discovered keeps recurring and demands a solution. The conceivable remote possibilities keep multiplying till, perhaps, in almost every action he feels that he is betraying himself. And so a normal and healthy reaction passes into an abnormal and injurious one—the psychotaxis becomes parataxis. The further growth of this type of reaction depends upon the constitutional make-up. It seems most readily, however, to pass into or become associated with the anxious depressions, dementia præcox, the compulsion neuroses, or the phobias.

The Parataxis of Anxiety: Examples.—The first example that we give came under observation when the patient had already, perhaps, passed into the stage of a psychosis.

The patient was a nurse of about thirty-five who had been worried to the point of incapacitation by anxiety that others would think that she was not doing her work properly. At the same time, she felt that her mind was getting dull, and she feared that others would perceive this and also divine the cause. She asked for a leave of absence, but this was not granted. She clung on to her work with the aid of an assistant. She was then worried lest she be held responsible for her assistant's work, and felt she should assume entire charge, but this she felt unable to do. About the same time, she commenced to think that others were making remarks about her. They knew she was incapacitated and why. Finally, the whole situation became intolerable and she resigned her position with manifestations of abnormal excited anxiety. She was sent to a hospital for nervous disorders where her suspicions continued, changing only their form with the new environment.

Associated with the anxiety reaction was a very marked reaction of "shifting responsibility." She was in no way to blame for the whole situation. In the first place, she would have been entirely herself had they given her a short rest when it was imperatively needed. Furthermore, people were drugging her and changing her moods from hour to hour in the day. If they would only let her alone she would get well. It soon became apparent to her that in the institution also, people were suspecting her. They had noticed her attractiveness. (Her attractiveness, by the way, was of very moderate degree.) They wondered why she was not married. If she did not get away they would soon know all. Furthermore, she felt sure that they suspected why her mind was dull.

She felt that she must, at all hazards, get out of the institution. It was her old difficulty all over again. She had been living once with her brother's family as happy as she could be anywhere on earth. Suspicion commenced to disturb her mind. People seemed to be watching her. Finally, one day someone said: "A nice girl like you ought to be married." This upset her completely. She felt more and more that someone had told her secret. Life in her brother's house became unbearable—though everyone there was kindness itself, she felt that she must leave. So she went many miles away, where no one would know and none would care. But, when away, she had no longer the stay of sympathy. No one really did care whether she was efficient or not. She became suspicious of others and so her final breakdown ensued.

One day she sent for me—she wanted to tell me all her story. (Exhibitionism?) When I came, she said I had come too late. If they had only sent for me sooner, everything would have gone on well. But now she felt a force hindering the expression of herself. (Negativism?) She had been drugged. Her mood had been changed. Why would not people let her alone? Then suddenly, she commenced her story, after being urged to let the matter drop for the present.

From the story, the underlying mechanism of her delusions became apparent. When nineteen, she suffered an illegitimate

pregnancy. The event was kept a secret as far as possible. Some members of the family never heard of it. From that day on she lived a life of fear and trembling. She was in constant dread of the secret leaking out into new channels. When her suspicions became aroused she felt impelled to change her residence, which from time to time she actually did, and finally left home altogether, going very far away. Her difficulties were increased by sexual temptations. She thought that people would know that she was guilty when they noticed her becoming dull and inefficient. Her sexual excitement was attributed to outside influences. People were experimenting on her. A patient brought into the next room was a hypnotist who excited her by his art. Drugs were put into her food for the same reason. She was in no way responsible for her temptations. She was a good girl and had always been good. Why could not people let her alone?

An immediate amelioration and clearing up of the delusion was affected by analysis, and helping her to understand that her false attributions were due to an unwillingness to look at herself as she really was. She, therefore, by an unconscious mechanism transferred responsibility to various influences in the outside world. She was also urged to face the past, but to make no account of her fears that an event of sixteen years ago was causing discussion about her at the present. She should shoulder the responsibility of the past and face all the possibilities of the present, hiding nothing from her own mind.

The amelioration, however, was only temporary and was followed a few days later by an attempt at suicide. This consisted in merely taking a few grains of veronal; and we could not determine whether or not the attempt was one with real suicidal intent or a dramatic appeal for sympathy. The patient was transferred to another hospital, and has remained for some years without further deterioration, but harbors the fixed idea that a man is exerting a malign influence over her life.

In this case, we are dealing, in the stage first depicted, with a parataxis that approached the stage of a psychosis. It developed later into what would probably be diagnosed correctly as dementia præcox. The fundamental note was the condition of anxiety, the

mechanism of which was apparent after a little analysis. Without this analysis the anxiety seems utterly unmotived. Why should people suspect her? Why should they think she was inefficient? When we are simply told that they do, the condition seems very strange, but when we get an insight into the patient's inner life, the type of reaction is perfectly comprehensible to us for we see the mental roots of her delusions.

Scrupulosity is a form that the anxiety type of reaction sometimes takes. By this term, I refer particularly to the condition in which the patient worries a great deal about whether or not trivial things are grievous sins, and is especially perturbed about the possibility of having committed grievous sexual offences, when, as a matter of fact, these patients have usually been quite free from such delinquency. They feel impelled to go over their sins in great detail in confession, and if they have committed more or less serious sexual offences in the past, they have an irresistible impulse to tell the whole affair all over again for fear that they may not have told it just right before.

The mechanism of this condition is probably not uniform.

The most common mechanism at the root of the scrupulosity, which produces a constant drive to confess and confess again, is probably a modification of the more or less crude impulse of exhibitionism. In one case of scrupulosity, the dream content of the individual had frequently to do with being seen more or less undressed, and also of confessing her sins before various individuals and at social gatherings. The crude impulse of exhibitionism had been repressed and sought outlet in the attempt to rehash sexual offences over and over again. This was contrary, however, to ordinary modesty and reserve, and, from the conflict between the two sets of impulses, arose the anxiety as it *so often does when the war between opposing trends becomes acute.*

In other cases of scrupulosity, I have found a history of actual crude exhibitionism in childhood.

It is to be noted that the scrupulous are mostly women. I have known it to exist in one man of pronounced homosexual trend. It appeared here to have another factor. He felt impelled

to go over and over his confession, and felt, at the same time, an obligation to enter the religious life. On being told that he probably had no vocation to the religious life, his scrupulosity cleared up at once and did not return. It was, in large measure, a defense reaction against doing what he felt obliged to do for purely logical reasons, while all the instincts of animal nature rebelled against it. That precisely this defense reaction was chosen rather than another was probably due to a pronounced tendency to exhibitionism in a man with homosexual trends.

When from analysis of a scrupulous individual, one finds evidence of a sublimated exhibitionism, and presents that finally to the patient, there is at first an acute exacerbation, followed by a distinct amelioration. The intensity of the exacerbation is variable.

Anxiety Neurosis.—In the war neuroses, a condition of anxiety, was sometimes noticed. One must not confound it with mere timorousness in action. Fear and anxiety are two very different emotions. The man who breaks down at the front from pure fear and candidly owns up to it, is not the type of mind that develops what has been termed the anxiety neurosis. But between the two types there are all degrees of transition. At one end we have the state of pure downright fear. The man falls out of line in an advance or, if he is in a trench, gets pale and shaky, and altogether unfit for duty, and has to be sent to the rear. When questioned at the triage or evacuation hospital, he says, "I simply cannot stand up when I hear those shells." And if you ask him point-blank—"Do you mean to say that you were afraid?" He says, "Yes." The candid admission of fear at the first questioning is rather rare. Patients usually attribute their condition to being tired out. But if one suggest that a patient be given a rest, and sent back, some acquiesce, go back to the front, and are returned at once as unfit for duty. Others at once enter a demurrer, say they cannot stand it, are afraid of the sound of the guns. It is rather curious that so many say they are afraid of the *sound* of the guns, and fail to mention that they are afraid that they might be *hit* by a shell.

The ease with which soldiers own up to being afraid of death is, as I have said, variable. Some seem to know that they were cowards at the front, but are unwilling to admit it in the rear. It is a shameful thing for a soldier to admit, and it is, after all, a sign of a certain amount of wholesome self-respect when a man does not blurt right out, and say: "I am afraid, I can't stand up under fire." There are others who have started out with good intentions, have been through a number of engagements, and finally break down; and when they do they not only will not admit that they were afraid of death, but seem to be really unconscious of the fact that the fear of personal danger had anything to do with their breakdown.

Before this breakdown they often go through a period of what may be termed "sensitization to danger." I have examined a number of men who volunteered and went to their first engagement with the greatest enthusiasm, and carried on under severe shell fire, doing the full duty of a soldier. But in their second or third or *n*th engagement, they break down and are fit for nothing ever afterwards. An actual concussion experience at the front is one that seems to defy all previous attempts to imagine it. The schoolboy's idealistic dream of a battle is one thing. The battlefield itself is something very different. After long marches in the rain, sleeping in "pup" tents on wet ground, after sneaking into positions in the dark, and tumbling over the dead bodies of those who went before, after a harrowing experience of waiting under shell fire, the schoolboy finally goes over the top. A shell bursts near him, kills some of his companions, and blows him up into the air and lands him in the mud, bruised, trembling and dazed. Then he gets up, and mindful of his duty as a soldier, goes on for several days perhaps without food, wet, with no place to sleep, and unable to build a fire at night to dry his rain-soaked clothes, and to warm his chilled body, and cold-blue hands and feet, for fear of attracting the shells of the enemy. At night there is, perhaps, quiet and time to think of the home he left behind, of the prospects he had for the future, of the dangers that lie before him, of the friends that he has seen killed before his eyes. Perhaps his face has been spattered with their

very flesh and blood. And so he passes the several days of the advance, but with credit to himself and to his country. His regiment is finally relieved. He goes back to a so-called "rest area." He refuses to think that he was so unsoldierly as to waver at any time, and buoys himself up with a sense of duty done. He may go through several such advances, but there comes a time when in the "rest area" he is more fatigued than usual. He gets no letters from home. He becomes anxious. There must be something the matter with someone at home or they would write. If he starts to think about the next advance he puts it out of his mind. But he allows full play to his imagination in picturing home conditions. "For after all," he says, "it's a man's duty to think about his dear ones." His worry and anxiety become almost constant. He cannot sleep. The relative quiet of the "rest area" has not relieved, but increased the feeling of tension. His regiment gets orders to relieve another one in the front lines. He arrives again in a region where a few shells are falling. He notices that he jumps when the shells explode much more than he did before. He becomes afraid that others will detect it. As a matter of fact, others do see that something is the matter. He tries his best to stand up and do his duty, but he cannot. He has been "sensitized" to shell fire and is good for nothing at the front. He is sent back with tremors that in typical cases soon disappear. But he remains more or less fatigued, worried, and anxious. Although he receives good news from home he is surprised to find that it does not relieve his mind. Perhaps something has happened in the meantime. His anxiety, though, appears even to himself as somewhat unreasonable. He is thoroughly ashamed of himself; feels, however, utterly incapacitated, and frankly admits that he is now no longer in a condition to be of service at the front.

Some are inclined to attribute the process of sensitization to actual organic lesions in the central nervous or vascular systems, or both, due to the effect of high explosives. If, however, we are to credit the accounts given by the soldiers themselves, purely psychological causes may be present. Thus, patients are sensitized who never had an actual concussion experience. Mere

sight of the carnage has been enough to unfit an enthusiastic volunteer for further duty. Others have been blown up by shells at various times without being bothered in the least. But after intimate chums were shot down right before their eyes they found themselves unable to carry on in the next engagement. It is probable that sensitization consists in having it brought home to one very vividly and forcibly that "these bursting shells may do to me what I have seen them do to others, perhaps to someone other for whom I entertain a special affection." It is strange that some break down so soon when others are capable of going through so much, and for such a long period before they finally become sensitive to the experiences of war. Thus, MacCurdy[1] gives a very interesting case of a man who went through over two years of war, rising from a private to a lieutenant, and finally broke down with an anxiety neurosis after a definite prelude of sensitization. In such cases it would be interesting to look for extraneous psychological factors so as to see whether or not the final breakdown was due to long-continued physical and mental strain, or to the complication of new mental problems changing the patient's general attitude.

What seemed characteristic of the anxiety neuroses at the front, was the repression of the idea of being afraid, so that in typical cases the patient was wholly unconscious of the fact that he was incapacitated because of his fear of death or personal injury. The fear was then displaced in consciousness to some fictitious object. The most common object was home conditions. "I have received no news from home, something must have happened, someone may be sick or dead." A little reflection, however, would show one that letters from home were not to be expected. In the first place, the postal service was bad, and long delays were common; in the second place, the soldier had been with a regiment always moving, and perhaps long out of touch with postal communication. Reference of the anxiety to a laudable solicitude for those at home excused the patient, and defended him from the shameful admission that he, a soldier, was afraid of death. The conflict between his fear of death and

[1] *War Neuroses*, Utica State Hosp. Press, 1918, pp. 4–6.

his desire for military glory and the honor and respect of his comrades, and perhaps also his sense of duty, was the fundamental cause of his anxiety.

Even in these cases we see the tendency of the cause of anxiety to be forgotten. When this takes place, and the parataxis develops into a full-blown hysteria, instances are known where the physical symptoms of fear are called forth by some incident that has an unrecognized association with the cause of the condition, and the patient suffers from palpitation of the heart, nausea, dizziness, etc. The reaction appears to be wholly without cause and its real significance is revealed only after analysis.

Etiology of Anxiety.—The normal psychotaxis of anxiety is nothing but an impulse to use the ability to think over a situation and its dangers. It may be called forth by the apprehension of the possibility of any painful event whatsoever. Individuals differ markedly in their tendency to persevere in the impulse. This marked difference is probably due to hereditary factors, so that anxiety is not a wholly psychogenic mechanism. There is, however, a psychogenic factor that enters into pathological states of anxiety, and that is an apparently irreconcilable conflict between incompatible desires. The soldier, for instance, cannot be sure of saving his life if he risks it. If he tries to save it he runs into the danger of being called a coward. It was this conflict that lay at the basis of the anxiety neuroses of the war. These neuroses differed from the other war neuroses in that the patients from one point of view desired, and from another point of view did not desire both horns of their dilemma. They wanted to make good, but they did not want to be killed. They wanted to escape danger, but they did not want to be called cowards. Other patients, who had no very strong desire to make good, and were bent mainly on shrinking from danger, responded to the same situation by some kind of defense reaction that disabled them and withdrew them from the zone of operations.

A similar conflict exists in those whose conflict proceeds from difficulties of the moral life. They want to keep the moral law, and maintain an appearance of respectability in the eyes of

others, and also in the forum of their own conscience; and at the same time they feel a craving for pleasures that are prohibited by the moral law. This craving is suppressed with more or less success. If unsuccessful, so that the craving is at times indulged, the anxiety remains associated with the desire that causes it. If successfully, so that the craving is never indulged, and the patient does not even admit to himself that he has it, the anxiety is likely to attach itself to other things in which the patient does not scruple to admit his interest. Thus, in the war neuroses, the men worried about what might have happened at home. An officer in the engineering corps became obsessed with the fear that he might have left his instruments behind. Others worried lest they might have made some mistake.

The fears and anxieties resulting from such conditions are sometimes termed "phobias" and are often the symbolic expression of the suppressed desire. This is conditioned by the fact that one and the same thing from different points of view is both desired and not desired. A school-teacher came to me with a phobia that was gradually becoming more and more extensive. The basis of it was an infantile sexual curiosity. It commenced with the fear of a certain street through which she could not pass and, therefore, she had to take a long, circuitous route to school. Free associations revealed the fact, not only of early curiosity, but also that on this street the school-children were in the habit of writing obscene words and drawing obscene pictures on the walls. The anxiety about this street arose from the fact that she wanted to look at the walls but felt that she had to keep her eyes on the ground. Each time that she went through it, it renewed the whole conflict that was going on in her mind, so that it became a painful, fatiguing journey. If she looked up she was afraid that people would think that she was curious about the walls and then they would know all about her conflict. The necessity of restraining her eyes then extended to all sorts of public gatherings, to all streets that were crowded, to the classroom itself, so that teaching became an intolerable burden. The phobia became associated with a "compulsion neurosis"—

a tendency to look which had to be continually suppressed when in public.[2]

The conflict of incompatible desires, neither one of which will be downed, is the main factor in producing a state of anxiety. Exceptions will be found to the narrow Freudian concept, that anxiety neuroses arise only in cases in which sexual gratification is desired but not possible. The tension arising from the impossibility is a factor, but not the real cause. The anxiety arises from the natural tendency to consider possibilities in all sorts of difficult situations. When one is in a dilemma, and wants each side at the same time, and likewise fears lest he be impaled on either horn, the condition of worry is perpetuated. Repression leads to all sorts of symbolic expression and apparently unmotived outbreaks of the physical symptoms of anxiety and fear.

Treatment of Anxiety.—As a rule, the anxious person should be made to understand fully the cause of his anxiety. Realizing the true reason for his condition is frequently sufficient to bring it to an end in cases that are not of long standing. The treatment of the anxiety neuroses at the front consisted in nothing more than this—plus, of course, the short period of rest during which it was accomplished. The reason why mere knowledge of the subconscious motivation of behavior brings about its modification, may be shown by the following analogy. A man can play upon your mind, arouse your sympathies, and excite your resentment by presenting to you a number of plausible arguments, which he, by a knowledge of your character, knows will appeal to you. It is necessary for you to think all along that he is honestly striving for the ends he proposes to you. But if once you discover that he has been playing upon your emotivity for sinister ends of his own, about which he told you nothing, his power of influence dwindles into nothing. Our "lower self" is very fertile with these specious reasons. Attempt to

[2] Analysis helped this case, I think, but did not cure. It made work possible. It did not do away with the conflict. I was not successful in opening channels of compensation or sublimation that afforded adequate satisfaction. The opening of these channels and not analysis alone is the secret of success in curing such cases.

do anything good, but costing unpleasant exertion or repression, and at once the mind is ready with all manner of excuses. When the anxious person tends to the side of his dilemma that involves the exclusion of natural cravings, he meets with a storm of internal opposition. To understand fully the source of this opposition helps him for it enables him more easily to enter into paths of compensation or sublimation.

The fundamental cure consists, however, in the solution of the dilemma. One side must be taken and the other really and genuinely given up, or it must be satisfied in a manner that does not conflict with the demands of the other side. Thus, in a case reported by Frink,[8] a girl was cured of an anxiety about going out alone by analysis. The analysis made it possible for her to resume her friendship with a man she loved, and marry him. The opening up of this happy solution to her difficulties and its actual accomplishment was the real reason for her cure. It would have helped her but little to merely understand herself, if no solution to the problem of her future life had been offered.

Some doctors do not scruple at an attempt to bring the conflict to an end by sacrificing the moral law. Even Freud has entered a demurrer against such attempts by describing them as *wilde Psychoanalyse*. Whatever one may think about the moral law, he should regard it as embodying the sanctions of experience. It cannot be infringed upon with impunity. The Gordian knot of the psychosis is not to be cut, but unraveled. The patient needs not the skill of the physician for any such solution. Some patients with false consciences may be very much helped by finding out from a trustworthy moral guide that what troubles them so much is not a delinquency. But duty and moral obligations cannot be sacrificed in order to overcome anxiety, however great. The task of psychology is the finding of a real solution which will do away with the anxiety, and, at the same time, not deprive the patient of the safeguards of the moral law.

[8] *Morbid Fears and Compulsions*, 1918, pp. 444–495.

CHAPTER VII

PARATAXES OF DEFENSE

The Concept of the Defense Reactions.—Whenever it is possible for us to avoid or escape an unpleasant situation, we experience a strong tendency to do so. It makes no difference whether the difficulty be little or great, there is a natural tendency to avoid it. In some, this tendency may be obscured by ideals of conduct, but from birth it exists in all, and no one entirely overcomes it. The difficulty may come to us from without—from our relations to the external world, or it may come to us from within —from painful memories or unpleasant considerations. In the former case, we avoid persons or things, or shrink from situations that are unbearable. In the latter, we put disturbing memories or concepts out of our mind, and turn to other things. In both cases we may be said to defend ourselves against the experience of some unpleasantness.

This reaction has many modes, so that the psychotaxis of defense is a unit, not because of the means used in avoiding unpleasant conditions, but because of the unity of the cause that calls it forth—the unpleasantness of a disagreeable situation.

The defense reaction does not wait for mental considerations and voluntary initiation, though it may be intensified and sustained by the will. It is a prompt, natural, involuntary response to any unpleasant event whatsoever. There is an instinctive tendency, for example, to keep others from talking about anything in our life which we look upon as shameful or disgraceful. And, furthermore, we do not like to think about such incidents ourselves. Some may be inclined to deny this, but, if they examine themselves well enough, they will find not only events of their past life about which they do not desire any general conversation, but some events—especially those involving wounded pride—which they do not think about very often; and if they do, they are at once glossed over with excuses.

The Defense Reactions in Everyday Life.—There are a number of little ruses in everyday life whose true nature is seldom penetrated by the non-psychological observer. Go to a man and lay a plan before him. He praises it highly, and says, it's a "bully" scheme. Then he gets serious, says it's a very important matter, and suggests that you and he have a meeting with X and talk the thing over. If you are a psychologist, you are at once suspicious that there is some reason why your friend does not want to take part in your "bully" scheme. When the meeting takes place, and difficulties commence to multiply, then you know that the consultation is a defense reaction to keep your friend from saying yes when he has not the heart to say no.

Try to help an old man to put on his coat, or get out of a carriage, or into a car, and he impatiently pushes you aside. To accept your polite offer would mean an acknowledgment of its usefulness. This would bring home to him the fact that he is growing old, an unpleasant fact to face—and so, immediately the mechanism of his defense reaction is set going and he tells you, somewhat testily, that he is perfectly able to get along by himself.

Enter into the inner life of many a wit and you will find elements of sadness and trends of discontent. Wittiness is often a defense reaction against one's own unhappiness.

Let a toper resolve to quit drinking, and he will very soon think it necessary to take a little wine for his stomach's sake—in fact, he will realize that his whole physical constitution was, still is, and always will be such that a little alcohol is essential to his metabolic needs. Such ideas are defense reactions against the carrying out of his good resolutions.

Suppose a man makes up his mind to do an unjust act—one that involves some injury or hardship to his neighbor. He will soon commence to think that Jones, after all, deserves to be punished and corrected, and he is only meting out to Jones his just deserts. For every wrong that one may conceive of doing, there is always an excuse, which, though it does not exonerate, will at least diminish guilt. Excuses are defense reactions that ward off the unpleasant sense of personal guilt.

Men not only want to think well of themselves, but also to have all the world esteem them highly. If, therefore, they have motives or desires that the crowd condemns, they defend themselves against common opprobium by disguising the inner working of their minds. A common way of doing this is to manifest horror or disgust at the recital of the delinquencies of others by what might be termed an *old-maid shock reaction.* A certain amount of regret at the unfortunate actions of others is natural, and its manifestation has no especial significance. When, however, anyone betrays extraordinary disgust and expresses himself in very strong terms about the matter, his shock reaction is a "complex-indicator." He himself has had a great deal of trouble with the very matter he condemns. His manifest disturbance and horror about the affair is a defense reaction which keeps anyone from suspecting that one who is so violently shocked would ever have dreamed of such delinquencies, and tends, in fact, to lead others to think that they are peculiarly foreign to his nature.

These examples are illustrations of minor defense reactions in everyday life. Let us now consider the various types of this psychotaxis. In so doing we shall treat also the parataxic forms —the order of treatment being that of psychological similarity rather than pathological intensity.

Typical Defense Reactions. A. Those Proceeding from Internal Difficulties

1. **Forgetting.**—Forgetting is said to be a defense reaction. Freud propounded this theory in his psychopathology of everyday life, maintaining that if we forget a proper name there must be someone among our acquaintance, bearing this name or one similar to it, whom we dislike very much. So our inability to remember proper names in general, according to Freud, is due to their association with things that we do not like to remember.

So far there has been no adequate experimental investigation of this important psychological theory.

Peters published in Kraepelin's *Psychologische Arbeiten,*[1] in 1911, a study entitled: "Gefühl und Errinerung. Beiträge zur

[1] Vol. VI, pp. 197-260.

Errinerungsanalyse.'' In his experiments a word was spoken to a subject—such as yesterday, blame, might, silk, give, ugly, soldier, etc. The subject's task was to think as quickly as possible, without choice, upon some event of his past life, and as soon as he had done so, to say yes. The interval between giving the word and the subject's response was measured by a stop-watch. He was then asked: (1) Had the event when experienced a tone of feeling? If so, of what kind? (2) At the moment of its reminiscence had it a feeling tone? If so, of what kind? (3 How long ago did it happen? (4) How often was the same event experienced? (5) How often has this event been remembered? In 879 events thus remembered, 80 per cent., when experienced, had a tone of feeling; 16 per cent. were indifferent; 4 per cent. questionable. Of the events with feeling tones, 65 per cent. were pleasant, 30 per cent. unpleasant and 5 per cent. mixed.

E. N. Henderson, in 1911, took up the same problem.[2] Ten subjects were asked to give incidents remembered from his or her daily life—the earliest that could be recalled just as they arose, without selection. One hundred such memories were obtained from each subject. The memories were then classified, and it was found that 55.1 per cent. were agreeable, 11.8 per cent. indifferent, 33.1 per cent. disagreeable. The author argued that because pleasant experiences are much more numerous than unpleasant, therefore, we ''remember a larger proportion of our disagreeable experiences than we do of our agreeable ones.''[3]

In 1912, Karl Birnbaum published his study, *Ueber den Einfluss von Gefühlsfaktoren auf die Assoziationen.*[4] He chose what he regarded as: (1) Words which have a tone of feeling, such as death, health, riches; (2) indifferent words, such as hand, hat, house; (3) words which he supposed would have a personal feeling for the subject. Orderlies, supposed to be normal, showed no difference in their reaction time to pleasantly and indifferently toned

[2] "Do We Forget the Disagreeable?" *Journal of Philos. Psychol. and Scientific Methods,* VIII, pp. 432-437.

[3] *L.c.,* p. 436.

[4] *Monatsheft für Psychiatrie und Neurologie,* XXXII, pp. 95-123, 194-220.

words. Hysterical subjects showed no pronounced difference—but whatever difference there was indicated that unpleasantly toned words had a longer reaction time. Depressed patients also showed no pronounced difference in their reaction time.

In 1913, William D. Tait found[5] that words referring to pleasant things are remembered better than those referring to unpleasant things, but that indifferent words are not so well remembered as either pleasant or unpleasant words. His results, however, are clouded by the fact that he neglected to take into consideration the effects of retroactive inhibition.

None of these experiments really decides the question whether or not the association of a word with an event we do not wish to think about makes the word more difficult to recall.[6] For not all unpleasantness tends to make us want to forget. Hardships are remembered with pride. Again, no one can, by inspection alone, pick out indifferent words from those that are emotionally toned. What is indifferent to one subject leads to the liveliest associations with another.

In default, then, of experimental evidence, we can admit, as yet, only a certain amount of probability that there is in our psyche, not only a natural tendency to put out of our minds certain occurrences that we think about with reluctance, but also words that are associated with such unpleasant events. Certainly all forgetting is not of this type. The mere fading of sense impressions goes on at a definite rate. It is a logarithmic function of the time. This fading is independent of emotionally toned association. Is there over and above this another law of memory, in virtue of which we tend to forget all the associations of anything we hate or despise? This question cannot, as yet, be given a positive answer.

Besides the forgetting of words, amnesia for incidents and periods has been attributed to the desire to forget them. Long-forgotten incidents in childhood are brought out by association

[5] "The Effect of Psychophysical Attitudes on Memory," *The Journal of Abnormal Psychology*, 1913-14, VIII, pp. 10-37.

[6] A work in my own laboratory, as yet unfinished, tends so far to confirm the Freudian theory.

and looked upon as the cause of neurotic symptoms which disappear when their relation to the repressed memory is demonstrated. It happens very often that the demonstration of the connection between the symptoms and some repressed incident does not cure a psychosis. In such cases, psychoanalysts maintain that the analysis has not been pushed far enough to get at the deepest roots of the patient's difficulty. Writing from my own experience alone, I can only say that I have not as yet unearthed an event in any patient which was so completely buried that it was clearly impossible for the patient to recall it, under any circumstances whatsoever, without the aid of analysis. This is not in any sense a denial that such cases may exist. I have, however, several times seen cases in which it seemed to me that neurotic symptoms were due to their association with unpleasant memories while the patient himself saw no such connection.

It is said that a patient may forget a whole period as a defense reaction against his responsibility for acts committed during that period. Thus, a young man got married against his mother's will, ran away from home, got into trouble with his wife, and developed a twilight hysterical state from which he recovered with complete amnesia for everything that happened from the time he left home to his recovery. He developed, moreover, a complete loss of recognition of the woman he married. The teleological value of such an amnesia is evident. It defended him against the admission of responsibility for what he did, and enabled him to go home, and to be petted and nursed as a poor, unfortunate, sick boy.

The *petit mal* attacks of epilepsy often resemble such cases when their twilight state is sufficiently prolonged. Again, the forgetting is simply an element, one symptom in a complex which aims not directly at forgetting, but rather at disabling. The amnesia following concussion experiences in the war was often psychogenic. The reason for thinking so is the frequency with which many amnesias cleared up by suggestive treatment, such as faradic stimulation.

Patients who for days had had no recollection of any event in their past life, but went about in a dazed condition, would in

a few minutes have their memory completely restored by the suggestive effect of an electric battery. The motivation back of these amnesias was not a desire to forget, but to produce a condition that would necessitate the patient's return to the rear.

2. **Excitement.**—The constant, ceaseless activity of many individuals is a defense reaction against sorrows that have deprived them of the zest of living. Heroes and heroines in novels often plunge into seas of excitement, etc. In thus picturing their characters, novelists have but given expression to tendencies which they have observed in themselves or in others. Is it possible to conceive of the excited phase of manic-depressive insanity in this light? Does the depressed patient, after long nursing his sorrow, finally attempt to drown it by ceaseless and unending activity? I know of no evidence to show that this is the case other than the fact that the excitement of some normal individuals has its roots in a desire to forget. It may, therefore, be possible that some abnormal manic conditions are nothing more than accentuations of the psychotaxis of defense.

3. **Transfer of Blame.**—We are familiar with this psychotaxis in everyday life. Whenever two or more individuals are engaged in a task that fails or falls short of expectations, it is very rare that one of the individuals steps forward and shoulders the responsibility. If the undertaking succeeds all are usually ready to claim a lion's share in its accomplishment, but if it fails who is there to say: "It's my fault, blame me"? What is true of single tasks is true also of the failures of a lifetime. Men look back upon their life and attribute their downfall to the malign influence of enemies, to their unfortunate lack of opportunity, to their unhappy home conditions, to downright bad luck at critical moments, to everything that they can think of, except their mismanagement of their own personal affairs. If the saddest of all sad words of tongue or pen are these sad words: "It might have been," doubly sad are these words: "It might have been, if I had only acted as I could and should have done." If a man has enemies who attempt to bring about his downfall, it is often his own fault that he has made them. If a man fails through lack of opportunity, it is often due to the fact that he has not made him-

self the type of man in his trade or profession to be sought out, that opportunities may be offered him. If a man has bad luck at a critical moment, he is often responsible for bringing about the crisis, and his "bad luck" is sometimes a euphemism for his own poor judgment. If an unhappy home has been a drain upon his energies, he himself has often been the dominant factor in making his home unhappy. To realize all this fully, would be a deep affliction to any human being. Hence the mind tends to defend itself against any such painful experience and spontaneously transfers the blame to someone else.

So natural is this tendency, that even in little and trifling matters we blame, with delicious spontaneity, inanimate things for our own negligence. Thus, we kick the stone on which we stumble, whereas we ourselves should have looked out to see where we were walking. We curse the fountain pen that dries up, whereas we ourselves should have taken care to have it filled. We blame the razor that pulls, whereas it is our own business to keep it honed and stropped. We damn the fire that will not burn, when we ourselves laid it so it cannot burn, etc. There is no impulse among the psychotaxes that seem so natural to the human mind as this spontaneous transfer of blame.

Closely associated with it are suspicions and ideas of persecution. It is seldom that a successful man takes an attitude of suspicion towards others. It frequently happens, however, that when misfortune impends, or is already present, one commences to search for reasons—looking always without and never within—and so his attention is attracted to the peculiar actions of others. At first he suspects, finally he blames, and commences to think that he is persecuted.

Even minds that have suffered no organic toxic deterioration are capable, not merely of vague and groundless mistaken judgments about the actions and intentions of others, but also intricate suspicions and delusions of persecution. When, however, the critique of one's own opinions suffers some impairment from toxic cerebral conditions when the patient is painfully aware of the ruin of his life, he reacts to that unhappy situation by transferring the blame to others in the most bizarre and impossible fash-

ion. Hence, when patients have sensory hallucinations, they do not attribute it to the disordered action of their own mind. To admit that their mind might possibly be deranged would be to court the very spectre that they fear. Therefore, another explanation is sought, and when the critique of judgment is gone, no interpretation is too impossible to be grasped at as an escape from the awful realization of actually present insanity. Consequently, if they feel a tingling in the skin, someone is giving them electric shocks. This someone is often an individual whom they dislike or of whom they were jealous before their mental derangement. If they have auditory hallucinations they feel that the vile words could not possibly come from their pure minds, and so attribute them to beings that are persecuting them, men or devils as the case may be. So, also, hallucinatory flashes of light are attributed to the malign influence of enemies who are throwing searchlights on the wall and into the room where they sleep, etc.

B. Defense Reactions Resulting from External Circumstances

1. Negativism; Description.—Negativism is a term introduced by the German psychiatrist, Kahlbaum, to designate a common psychopathic condition in which the patients shut themselves out from the influence of all external impressions, become wholly unapproachable towards personal communications, resist any order, persuasion or suggestion, and often do precisely the opposite of what is requested. Such patients will often maintain peculiar attitudes all day long, apparently oblivious to everything that is going on about them. Questioning them after they have come out of the condition shows that they have all along taken in most of what was happening. They have learned the names of doctors and patients whom they never met before they came to the ward, and have picked up a great deal of information from the gossip of the patients. If a negativistic person is standing, and you ask him to sit, he holds himself as stiff as a poker. If he is sitting and you ask him to stand, he clutches the chair in apparent defiance. Frequently they remain silent for days (mutism).

Often they refuse food. Sometimes they will not eat their own dinner but will steal that of a fellow-patient.

Roots in Normal Life.—It would be a mistake to regard this reaction as the product entirely of psychopathic conditions. Careful observation of normal individuals, especially children, will reveal its embryonic stages. Children are negativistic toward one whom they dislike; when they are angry, towards everybody. If a man whom a child dislikes tells him to sit down the youngster is very likely to respond by standing erect and saying, "I won't." In fact, children dislike being ordered about by anyone, and purely from this distaste, have a tendency to do just the opposite of what is commanded. Nor do adults entirely grow out of this childish impulse. Nobody likes to be ordered about. It lowers self-estimation to be under anyone's thumb; but to show our independence, letting the would-be-tyrant see that he has no authority, going against his orders and doing just the opposite, gives one a satisfying sense of self-sufficiency, and perhaps even a feeling of superiority.

The Shut-in Type of Reaction.—Negativism as a normal psychotaxis never extends its ban beyond certain individuals, except for periods of anger and pouting, which pass away in a few hours or a few days at the most. Whenever the individual is negativisitic towards the whole world for long periods, the condition has passed from the psychotaxis to the parataxis, and is no longer normal. We may speak of a character manifesting this kind of parataxis as a shut-in reaction type. It is a common reaction in boys when they leave home and go to school. From an environment where they had pretty much everything their own way, some boys pass to the boarding-school where very little goes according to their liking. Instead of yielding to their whims, the new companions fight. Bigger boys bully them, small boys tease them, so that the youngster, who has been fondly coddled and cockered at home by unwisely indulgent parents, has to learn his first lessons in self-restraint from those who administer it without mercy. Some shrink back from these harsh surroundings and become the quiet, lonely, friendless, much teased, and little respected boys that are familiar sights in most large institutions.

Francis Thompson attributed this reaction type to Shelley. In his description of Shelley, he merely expressed his own experience, and defined for us perfectly the præcox reaction of the child.

"So beset, the child fled into the tower of his own soul, and raised the drawbridge. He threw out a reserve encysted in which he grew to maturity unaffected by intercourses that modify the maturity of others into the thing we call a man."[7]

Case History.—Some cases of this parataxis of recoil very closely resemble dementia præcox, but they clear up too quickly for us to think that we have really been dealing with the deterioration implied by a dementia. The following case, except for its prompt recovery, would probably have been diagnosed as dementia præcox.

Patient was a soldier, private in A. E. F., white, age twenty-six. In 1910 he had a mental breakdown in which he fell into a kind of dreamy shut-in state, much more profound than the present. This he attributed to a wild life with prostitutes and private sexual excesses. His personal history was otherwise negative.

He was drafted, and arrived in France in August, and got to the front in September. He saw service in a signal service platoon. He was at first frightened at the sound of the big guns, but soon got used to them. He went to the Toul sector and was in the drive of the last three days of the war, helping to string wires. He did his duty during the period of the activities. His trouble did not commence until his regiment started to withdraw after the armistice. The first thing he noticed was that he worried about his friends among the boys who were at the front. He wondered how they came out. Then he was troubled with insomnia. He then noticed he was getting run down. He was slow about putting his pack together. He was slow to think. He felt sad about the war—about the friends he had lost among the boys whom he knew who had been badly wounded—and the many more whom he did not know. Finally, on his way to Chaumont he broke down entirely. He simply could not get his pack together. He was not conscious of wanting to evade his duty, but he was think-

[7] *Essay on Shelley*, London, 1909, pp. 33-34.

ing about home and his present unhappy lot. He was sent to a base hospital where he was reported to have many trends suggesting a præcox personality, as reticence, lack of frankness, and seclusiveness.

When I saw him in another hospital, the præcox symptoms were more pronounced. He did not speak unless someone addressed him. He often soiled the bed. He kept his eyes closed a great deal of the time though he was not sleeping. When his eyes were not closed, they were wide open, staring into space. Sometimes he stood for a long while in peculiar katatonic attitudes, apparently asleep. If you tapped him on the shoulder, he startled like one awakening from sleep, and on attempting to engage him in conversation, he stared at you in a peculiar manner, smiled in a sickly fashion, started a sentence, and without finishing it lapsed into a dreamy silence.

Repeated efforts to get him to talk were more and more successful. Finally, he told something of the content of his mind while dreaming in his awkward position. He rambled on about how there is a duplicate of every man, and that there is to be a wonderful new world. Everything is cheerful. There is a great Christian army. They will help everyone. God leads it. Then he complained of the swearing that he had to listen to all around him. Again he talked about the navy, then of his girl, and of her wonderful part in the army, and how all the nurses and all the telephone operators had a great work to do in running the switchboards.

I then merely suggested to him that he was like a man asleep and had mixed up the United States Army with the work he hoped to do for social betterment after he returned to America. His eyes stared a little and he seemed to have an inkling that what I said might be true. On the theory that I was dealing with a parataxis of recoil, a shrinking into dream-life to get away from unpleasant surroundings, I tried to bring him into contact with reality by taking him to the shop and getting him interested in a little carpentry. Every few days I had a talk with him about the army and tried to disentangle the A. E. F. from his schemes for social betterment. There was a marked improvement in a

short while. It was interesting to watch the gradual, but steady clearing up of the peculiar staring expression. I asked him one day what he meant by the duplicate of every man. "Well," said he, "you know that when a person has a battle with himself there are two sides—apparently two different persons." I had no time to analyze his condition, nor was it necessary. In less than two weeks he had entirely cleared up with complete insight, and rational plans for the future.

I regarded the case as a parataxis of recoil, and not a depression (his attitude, manner, mood, conversation differed from that of manic-depressive patients) and not a dementia. I then argued that an attempt to draw him back to the real world should be successful. The therapeutic test lent confirmation to the theory. Whether the theory was correct or not, the case shows us a young man, no longer buoyed up by the excitement of war, worn out with marches, painfully conscious of his uncouth surroundings—the mud and the rain and the cursing of his companions—suffering also from a moral conflict within, finally breaking down, shutting the world out and entering into a dream-life by himself. Whatever deeper factors may have been present, the case illustrates fairly well the parataxis of recoil, and shows that such conditions may be cured without deep analysis, by merely attempting to draw the patient out of his dream-life with himself back once more to the world of things.

2. **Voluntary and Involuntary Incapacitation.**—The simplest form of defense against an unpleasant situation is withdrawal by incapacitation. Incapacitation may be consciously or unconsciously caused. There are two extreme forms of conscious and voluntary incapacitation. The first form is pure, downright malingering, that is, conscious pretense and imitation of disabilities that the patient knows he does not possess. The other is to inflict a wound on oneself voluntarily, in order to escape from duty. In the recent war, cases of the latter were more frequently detected than those of the former. The reason for this is that malingering seldom fabricates a condition that has no semblance of reality. It takes minor disabilities and pretends that they are greater than they really are. The exaggera-

tion of symptoms is sometimes, but not always, a voluntary and conscious act, because our own fears picture to us possibilities that have only a shadowy foundation. In many minds, the transition from fear that they may have a disabling symptom to belief that they do have it, is an easy one—especially if some advantage is to be reaped from the loss of function. It would seem, too, independent of any advantage to be reaped, that the suggestion "I am disabled" is planted by organic injuries and outlasts the anatomical and physiological disability. Thus, with all organic injuries, there is also a mental or functional accretion which makes the injury seem worse than it really is. What leads us to this conclusion is the fact that the disabilities which have their origin in organic injury can often be suddenly improved so much that they are practically cured, there being left behind only traces of the original condition. Were we studying disabilities from the medical rather than the psychological point of view, it might be well to introduce a few examples here from the rich material that the psychotherapy, developed at the front, has placed at our disposal. Here, however, we are interested in the psychotaxes and parataxes as elements in our mental life, and not in their medical aspects. The field of their manifestation is in the interesting group of cases that shade off from malingering over into neurasthenia and hysteria, and it is here that we may study them to the best advantage. There is no sharp dividing line between voluntary deception or malingering, and the unconscious manufacture of hysterical disabilities—any more than there is between the conscious and the unconscious.

The Reaction of Incapacitation in Childhood.—Children are so often incapacitated by the exaggeration of their minor ailments that we may regard most forms of this impulsive tendency in childhood as psychotaxic rather than parataxic in nature. Children quickly recover from hysterical ailments when they are made to realize that the disability is a far greater burden to them than an advantage, or, at least, that it does not obtain for them the calculated immunity, or much desired indulgence. Parents who do not understand this frequently have their children dominating the household. One of the more common forms of disability

in childhood is a functional chorea or rather choreiform movements.[8] Functional choreas sometimes clear up promptly on asafœtida, a drug that has no physiological action, but which to most children is so unpleasant to take that it is far more advantageous to get well than to continue the treatment. I have seen cases in which arsenic had no effect, clear up promptly on asafœtida. Now arsenic is not unpleasant to take, and is supposed to have an obscure, as yet unexplained, physiological action in curing chorea. It would look as if the unpleasantness, rather than the physiological action of the drug, was effective in certain cases.

Another form of disablement in children is the convulsive seizure. One boy that I examined had a convulsive seizure the second day he had to go to school, just as he was going out of the front gate. His mother ran out to him, picked him up, nursed him, fondled and petted him, and fed him daintly for several days thereafter. The consequence was that every time he was sent to school thereafter he had another convulsive seizure with a repetition of the coddling treatment. In this way he managed to avoid school altogether, and at seventeen could not read or write.

Another form is the tantrum—crying, shrieking, falling on the floor, kicking, biting, and carrying on generally in such a disreputable manner that the parents are put to shame, and the neighbors often think that the child is being very badly treated. Thus, it gets and enjoys a great deal of undeserved sympathy —the craving for which is so keen with most children.

There is no doubt that these reactions occur more easily in some children than in others, so that there is a constitutional factor always present. As a rule, it is insufficient to produce the condition. One child, who had the wildest tantrums I have ever seen, followed by foaming at the mouth and exhaustion so as to make one consider the possibility of an epileptic seizure, when taken away from home and administered one good whipping, changed his character completely, and became a gentle, well-mannered, and lovable child. Mismanagement at home, consisting

[8] This statement must not be taken as signifying that all chorea is functional.

in unwillingness to administer correction when it is indicated, and a false tenderness which delights in satisfying the child's every desire, is usually the prime factor in developing these parataxes of defense by which the child attempts to escape the unpleasant situations that arise in the course of its education and training.

It is from such children as these, in my opinion, that are recruited the ranks of the adult pretenders—whether they are downright malingerers, or are shirking their duties and responsibilities by the more circuitous route of a psychoneurosis.

There are two general forms which this defense reaction takes in the adult: (a) That of general disability, or (b) that of one or more special disabilities, or hysteria.

A. The Parataxis of General Disability.—When a man's work is humdrum and uninteresting, when there are elements of fundamental discontent in his life, so that he has nothing to make it seem worthwhile, it is very likely to become so burdensome to him that he feels himself incapacitated, and so breaks down and gives up. When in this condition a little exertion fatigues him; he is angered on the slightest provocation; he feels himself unjustly treated if his will is crossed in anything; he complains, grumbles, criticizes, becomes sour, cynical, discontented. At the front this condition was at times a disabling mechanism that kept men from doing their duty. It was the war neurosis which caused the most concern to the conscientious physicians. It is so difficult to exclude obscure, organic conditions as a cause of weakness and disability that one hesitates to label a case neurasthenia.

One of my cases, a lieutenant in the army, presented symptoms of fatigue that might easily have been due to overwork. He professed a desire to get back to work, which proved, however, not to be genuine. Physical examination was negative. He had at first only two subjective complaints, one that he was tired —the other that the little finger of his left hand became numb after people commenced to tell him that he looked tired. Rest only made him worse and more discontented. He constantly suggested that he should be sent to the Riviera—so constantly that I strongly suspected that his neurasthenia was only a disabling

mechanism to get out of hard work, and have a pleasant vacation at Nice.

It was interesting to watch the rapid restoration to health of this lieutenant and a number of grumbling, discontented, neurasthenic officers when the armistice was signed. Before this happy event, they felt that they were fit only for a base hospital —afterwards they manifested the most surprising zeal to be discharged from the hospital and get back to their organizations.

B. The Parataxis of Special Disablement.—We may classify the special disablements, by which neurotic individuals escape their duty, as sensory and motor. Thus, we have a deafness and blindness of psychogenic origin acting as a defense reaction against an unpleasant situation. The utility of such sensory anæsthesias is clearly apparent. Not so evident is the utility of cutaneous areas of anæsthesia in hysterical patients. Here they seem to have no direct function in the disabling mechanism. They may be interpreted as mere elements in a symptom complex, elements which, according to popular imagination, show the gravity of the situation. They may be easily produced in hysterical patients by merely attempting a sensory examination. Some maintain that they are always so produced, and never attempt to look for them. It is probable, however, that they antedate, in some cases, the physician's examination, for while one sometimes gets the impression that he is producing an area of anæsthesia by his tests and questions—in other cases the area is found so fully developed that it seems as if it must have existed previously. This must be so when the patient comes to a physician for the first time complaining of an area of numbness.

Motor disablements consist mainly in the functional paralyses and contractures, the aphonias (loss of speech), and the convulsive seizures.

Case History.—The following war neurosis shows us several of these disabling mechanisms in the same patient.

The patient was a first lieutenant who was a telegraph operator before enlisting in the regular army some years ago. Before coming to France he had seen service in Nicaragua, Vera Cruz, the Mexican border, and the Philippines, but had not been in

any fighting. He came to France in April, 1918, and got to the front in May. He was under heavy shell fire in Alsace, but it did not bother him. The first time he went over the top was west of the Meuse on September 25th. He had not advanced far when he was knocked down by a shell. He got up, but felt as if he had been all "churned up." Just as he was getting on his feet another shell slammed him down flat. He went forward about two hundred yards, and then he does not know what happened. When he came to, about twenty-four hours later, he was in a hospital—not wounded, but only scratched a little. After a couple of weeks in hospitals he was sent back to his regiment. He marched with them to a reserve position near Verdun. He remained only about three days, and was sent back to the hospital for "blind spells" which kept him from doing his work. These spells came on after slight exertion. "Everything would all haze up." He would then get weak and be unable to stand. When he came to from his "shell-shock" his right ear felt dead, and the scalp all over the right side of his head was numb. In the hospital he had no spells—the only symptom which remained to be treated was the deafness. This naturally might have been due to a ruptured ear drum, caused by the explosion. He could not hear a loud-spoken voice at a few feet when the left ear was covered. The fact that there was also no bone conduction of sound on the right side suggested[9] that the whole condition might be functional. Suggestive treatment with the aid of a tuning fork and an electric battery was tried, and in about a quarter of an hour the deafness and numbness of the scalp had entirely cleared up.

The spell of unconsciousness for which this officer was brought to the hospital was probably an hysterical seizure in action, which defended him against the necessity of any longer risking his life. His "blind spells" which came on after he got back to his regiment saved him from the danger of again going to the front, and the hysterical deafness which he manifested in the hospital when I saw him, was one element in his complex of symptoms that

[9] Bone conduction would have been intensified had the condition been due to a ruptured ear drum or any form of middle ear trouble due to concussion.

would demonstrate the severity of the concussion experience which had brought on his disability.

Anyone inclined to regard these so-called "shell-shock disabilities" as due to some organic disturbance from the concussion, would do well to consider the following facts:

(1) Prisoners of war rarely develop war neuroses. They no longer have need of a defense reaction to get them out of danger.

(2) The wounded who have been subjected to the same concussion experiences and have been disabled by the flying shrapnel of exploding shells are immune from the symptoms of "shell-shock." They are already disabled and need not develop a parataxis of disablement.

(3) The gunners, working at the big guns, continually being subjected to concussion experiences, do not develop functional disabilities.

(4) The war neuroses clear up too quickly by suggestive therapy for us to look upon them as having an organic pathology.

Convulsive seizures are frequently the cause of withdrawing an individual from his post of duty. They were very common at the front. In civil life they are often to be interpreted, not directly as a means of withdrawal, but rather as a protest against a situation which is looked upon as unjust, but from which the patient feels powerless to escape. Thus, in one instance, a woman was having periodic convulsive seizures of an hysterical character for which the best specialists that she had consulted could find no cause. The mental history of the patient revealed the fact that she had made an agreement with her husband before marriage that all the boys would be brought up Protestant, and the girls Catholic. This arrangement had been made subsequent to a prior one before the priest in which the usual promise had been made that all the children would be brought up Catholic. After that the marriage was postponed, but she was later married, ostensibly on the basis of the first agreement, the second one not being mentioned to the priest. The first child was a boy. She comforted herself with the thought that later on everything would come out right. But when her husband let her understand that

he would insist on the agreement, her trouble started, and a little later she had her first seizure. With a subsequent pregnancy she commenced to worry acutely about the religious problem, and the number of her seizures increased. Persuasion to adopt a more reasonable type of reaction, to attempt to dominate the situation by the example of her life, pointing out the futility of the spells, etc., led to a distinct improvement. This did not last long, for I learned afterwards that she suffered a relapse into her old condition. That her spells were psychogenic and not epileptiform, was the decision of several eminent specialists who saw her and witnessed one of the seizures which lasted for several hours. That they were motivated by a protest which expressed the thought: "See what you have done to me by your harsh and uncompromising attitude," is the interpretation which is warranted by the history of the case.

The Defense Reactions as Specific Impulses or Psychotaxes.—However varied their form, the defense reactions are spontaneous tendencies to get out of an unpleasant situation merely by avoiding it. The mode of avoidance is indeed mental, but it is no less impulsive than the motor impulses that one experiences to get out of a cold bath, or to get in out of the rain, or to go from the sun to the shade on a hot day, etc. Just as these tendencies may be experienced for some time without being acted upon, so, also, the psychotaxes of defense. Thus, the tendency to protest by a convulsive seizure may be experienced for days and weeks, but only be carried into action when an opportune moment arrives. Defense reactions are natural to all mankind. We all dislike to remember certain unpleasant situations of the past, and to consider various disagreeable eventualities of the future. Thus, to really realize the absolute certainty of our own death, and that it may not be very far distant, is naturally unpleasant, and very distinctly so, except to those who have schooled themselves in its thought. Most men have a spontaneous tendency to put this eventuality out of mind, and they just as spontaneously avoid everything that brings it up. Natural and spontaneous tendencies to make use of any ability in our mind to avoid an unpleasant thing, or a disagreeable situation, have every right to be

considered impulses; and, because they are impulses which have to do with the problems which arise in unpleasant situations, they belong to that group of mental reactions that we have termed the psychotaxes and parataxes.

Etiology of Defense Reactions.—The fundamental condition which calls forth a defense reaction is an unpleasant situation. The most natural thing to do with an unpleasant situation is to get out of it if you are in it, or to ward it off if it only impends. Children, before the age of reason, have no other way of dealing with pain and unhappiness. Later on, many considerations besides the pleasure of the moment enter into our deliberations. The rights of others, future consequences, moral problems, etc., are beyond the ken of the little child. The problem of training and education is to bring them within his ken, and enable him to settle things on other grounds than present whims and fancies. The true goal of education may be expressed as the attainment of the ability to shoulder the problems of life. Our horror of the unpleasant tends to make us throw that responsibility on the shoulders of others—to get out of it in any way, but at all events to avoid it. Thus, our defense reactions are constantly stimulated by our contact with the world. Many a fond mother tries to spare her child the bitterness which comes from unsatisfied desires, and so makes the vain attempt to raise him in an Eden of delight. Often this attempt to coddle the child commences at birth. The child is rocked and fed almost as often as it cries. There is no régime of life established, and the child soon learns that it gets what it wants by crying and tantrums. When it reaches the age of reason, there is no inculcation of principles of duty and self-sacrifice, and so it grows into boyhood and manhood, and has no idea of dealing with an unpleasant situation other than to avoid it. The child never learned the lesson of shouldering responsibility, and the man cannot do so.

The analogy between the spoiled child and the parataxis of defense is so striking that it strongly suggests that improper schooling for life has been one factor in bringing about the psychoneuroses in which these reactions are dominating elements. A study, which would investigate the home-training of patients

manifesting these psychotaxes, would probably reveal much coddling and spoiling in their childhood. It would be difficult, however, to get reliable witnesses from whom to gather information.

The recognition of this psychogenic factor does not exclude a constitutional groundwork for the parataxis. Some children who have been spoiled at home learn their lesson when thrown upon the mercy of school companions. Others react with a parataxis of withdrawal. Their negativism might have been avoided, had they been properly trained from infancy, but the reason why they are negativistic at boarding-school, and not "one of the bunch" is to be sought in constitutional hereditary factors.

Treatment of Defense Reactions.—All treatment should spring from a knowledge of causes. If the etiology above suggested is correct, the prophylaxis of the parataxes of defense is to be commenced at birth with a rational hygiene and régime which will be the basis of future instructions in the principles of law and order, and which will teach the child from the outset that crying and tantrums are not the keys which open the door to satisfactions that are withheld or refused. Many of these parataxes of defense are simply the perseveration of childish reactions. Prophylaxis, then, should aim at eliminating them in the transition from childhood to boyhood. This is to be done by a strict régime in childhood regulating the hours of feeding and retiring, and later, of play and study. If a child has a tantrum because he is denied something that he wants, he must be made to understand that this is no way to get it. If he has an hysterical convulsive seizure he is to be left alone till he comes out of it. As soon as possible he must be shown by examples and explanations that he is not in the world to seek his own personal pleasure, but to find something useful and do it; that he has duties, obligations, and responsibilities, and that there is nothing nobler in life than to assume them and bear them with dignity and honor. To shirk is a despicable and shameful act. I cannot believe that the whining evaders of responsibility that got into the psychiatrical wards in this country and in France were ever taught the moral lessons of human responsibility, or had ever

learned to sacrifice themselves even in little things for the welfare of others.

Once a parataxic reaction has developed, further treatment depends upon its nature. The attempt must be made, at all hazzards, to draw the shut-in type of patient out of his dreams and back to reality. He must be taught that it is far better to actually accomplish a simple job of carpentry than to dream of building temples; better to earn a penny than to picture oneself the proud possessor of millions. In many præcox reaction types such efforts will be crowned with surprising success. Once a child of four was brought to the clinic. It was impossible to engage it in conversation. At most, it answered "yes" or "no," or echoed the last words of your question (echolalia). It took peculiar attitudes, stared into space, suddenly fell into fixed positions. *Flexibilitas cerea* was well developed, that is, you could mold its legs and arms into any position and there they would remain indefinitely. The child's mother had been recently taken to the insane asylum, and the child was in an orphan home where all the children were much older than itself. It had no playmates, and had lost its mother. On the assumption that these katatonic symptoms were associated with the shut-in reaction type, and, therefore, symptomatic of a parataxis of recoil, I argued that the condition could be cured if the child were placed with other children of its own age who would get it to playing, and so draw it out of itself. This recommendation was accordingly made, and was carried out with surprisingly successful results. The mental condition cleared up, and within a week it was laughing, and playing, and talking like other children. Traces of the *flexibilitas cerea* lasted longer, and could be demonstrated weeks later—though they would have passed unnoticed by one who had not seen the child when the condition was at its height.

In treating the parataxes of disablement, one should find out, if possible, the motivation which lies at the bottom of the condition, and then attempt to find, for the patient, some more satisfactory solution, and, if possible, create a desire to get well. If this can be done the cure can then be hastened by such suggestive means as an electric battery. Physiological explanations help

whenever they are in place. Thus, to explain the mechanism of muscular contraction to a patient with a disabling tremor, the contraction of the agonists and relaxation of the antagonists, to show him that a tremor must result when both sets of muscles contract, and then to take his trembling arm, for example, and temporarily conquer the tremor by a few movements of relaxation, and assure him that he can do the same—all helps to make the tremor disappear. I have seen arm tremors of patients just back from the battlefield clear up permanently in two or three minutes with such treatment.[10]

Hysterical convulsive seizures should be made "not worthwhile" by neglecting them as of absolutely no significance, or by treating them with an emetic. An hysterical girl was once brought to the clinic—her face all broken out with a bromide eruption. In spite of heavy doses of bromides, her nightly convulsive seizures had not been overcome. Directions were given to have her sleep alone, well away from anyone else, and to pay no attention to any future convulsions, and to stop the bromides. After one tantrum, which she was left to finish by herself, the convulsive seizures ceased. She uttered the complaint, however, that nobody cared whether she died in one of her spells or not.

Ingenuity in finding more reasonable solutions for the patient's unpleasant situation, persuasion, and encouragement to bear his burden manfully, sympathy and kindliness, all have their function in dealing with these cases. Whatever we may think of the moral degradation of a shirker had best be kept to ourselves till we have cured the patient's disability. We may then instruct and philosophize. I once made the mistake of letting a big, strapping fellow know what I thought of his limp and hysterical gait. He at once became very antagonistic to me, and clung tightly to his disability in order to prove that I was a very poor diagnostician.

Opening new vistas and channels of compensation and sublimation has its function in these, as well as in the other parataxes.

[10] Cf. *infra*, p. 295 ff.

CHAPTER VIII

COMPENSATION

The Concept of Compensation.—The root of compensation lies in our multiple interests in life. Our impulses and desires are many and diverse, and, therefore, the possible modes in which they may be satisfied are many and diverse. At the beginning of life, all ways are more or less equally possible, for none has been tasted. With tasting develops appreciation, and a craving for more. This results in an eventual fixation on some form of satisfaction which ultimately dominates life, and, if adequate, leads to more or less peace and happiness.

Through the accidents of life—sickness, death, financial loss, the intervention of other human beings, etc.—the psychic fixation may be broken, and the plan of life on which it depended disintegrated. The result is unhappiness and restlessness. We have already considered some of the readjustments that such calamities bring about. Very different from these is the compensatory readjustment. It is perhaps the antithesis of the psychotaxis of depression. Depression leads to sadness and inactivity; compensation, to an attempt to get rid of sadness by action that leads to a refixation. *Compensation, therefore, is an attempt to make good one loss by finding an equivalent substitute.* The compensating character must be active. He demands promptly the equivalent of his loss. He cannot mope and mourn. He may even disregard the sanctioned customs of religion and society that he may promptly make good the deficit in his mental life.

Ordinary Compensation.—Not every loss knocks out the keystone of the arch in our hierarchy of desires. There are great losses and little ones, and so there are, corresponding to these losses, major and minor compensations. Many of these minor compensations are trivial indeed, but they mean a great deal in the general tone of the mental life. The United States Army realized the value of these minor compensations when it sanctioned the establishment of the Red Cross, Y. M. C. A., and

K. of C. huts in the camps and hospitals in this country and in France; and furthered the work of entertainment carried on by the chaplains. What was thus offered to the soldiers was, when we leave out of consideration religious service, nothing but a series of trifles; but these trifles prevented many a mental breakdown, and sprinkled a life that would have been otherwise scarcely endurable, with moments of rest and enjoyment.

In civil life also, the theatre, the movies, and all the varied and numerous entertainments of modern life, offer some compensation for trivial losses, and even lighten the burden of those who have suffered life's gravest calamities.

Wit is often the compensation of one whose inner life is far from the peaceful content that comes to him who has worked out a satisfactory solution to the riddle of existence.

Literature is a twofold compensation: First of all, to him who composes the poem or the novel or the short story, and secondly, to his readers. The author dreams of his own unfulfilled desires and compensates himself for life's disappointments by living out in imagination the dream that he weaves for his readers; his readers are charmed and attracted because they see in the hero or heroine one whose lot they secretly wish might be theirs. Therefore, it is possible to analyze an author by analyzing his poems or his romances; or to get an insight into the deeper trends of anyone's life by learning what poems or novels he finds particularly interesting.

It is not necessary to write in order to dream. Many are the unrecorded dreams that some people indulge in during the waking hours of the day. Some take keen delight in this vain and fruitless exercise, wasting hours that might lay the foundation of real accomplishment, and lead to the enjoyment in reality of what they are doomed to taste only in their dreams.

The dreams of the night, though involuntary, and quickly forgotten, are nevertheless compensatory mechanisms. To a large extent, they are, as we have seen, wish-fulfilments, and, as such, act perhaps as safety valves, lessening to some extent the nervous tension of repression that makes part of the burden of the day.

Pets and playthings of one kind or another compensate for more adequate sources of human satisfaction. Many a woman lavishes on a dog the affection that should go, by right, to a child of her own or of her adoption. Unfortunately, however, dogs are more frequently adopted than children.

Intellectual pursuits compensate only a few, and yet art, music or science are fully adequate to give to a human being a high degree of natural peace and content.

The minor share of the things of the mind in the compensations of the age is probably due to the fact that education aims too much in our day at mere bread winning and too little at awakening of the mind to the appreciation of the treasures of the intellectual life. And hence education too often launches men on a career, but leaves them helpless in case of mental shipwreck on any one of the reefs of life's calamities.

Companionship and the sympathy that it provides affords the most common and the deepest compensation of our day. *Alter alterius onera portate.* Mutual kindness is the source of life's most genuine and deepest compensation.

The Parataxis of Compensation.—It is easy for any one of the ordinary compensations to become pathological by diverting the mind from an adequate goal in life, by absorbing one's energies entirely, or accentuating a type of behavior that is unproductive and useless.

How many there are who idle their life away in trifles. Amusements that are meant as a momentary diversion become their daily occupation. Day-dreaming, which might be pardonable as the occasional occupation of an adolescent, leads some permanently to a life of unreality.

Friendship and kindly help are true sources of consolation to one who has lost a friend by death, or perhaps never had a true friend. They become true helps because the affection bestowed formerly on the relative or friend departed is unconsciously transferred to or, to speak more correctly, refixated on the one who helps and sympathizes. It is in general impossible for the one who helps and sympathizes to fully replace the one who is lost. Divine friendship alone can be universally extensive.

When the one who suffers attempts to make the partial transfer of ordinary friendships fully satisfy the loss sustained, this transfer becomes pathological, inasmuch as it prevents a normal readjustment with its multiple interests in life and fruitful occupation.

The line in which compensation is most likely to become pathological is sympathy. It is most remarkable to observe the extreme lengths to which men as well as women will go to get their much-craved sympathy. I can call to mind an able-bodied man at a funeral who had to be petted and coddled by his wife and daughter. His demonstrations of sorrow, certainly as far as outward appearances were concerned, looked like attempts to call forth sympathetic caresses that he enjoyed rather than genuine expressions of grief that he could not restrain.

There are a number of convulsive seizures that are to be explained as mentally motivated by an appeal for sympathy.

A fairly common psychic disorder is the loss of the voice—an aphonia. Such an affliction attracts attention, and with the attention comes the much-craved commiseration. I have seen several such cases, all of which yielded promptly, even though of months' or years' duration, to a little persuasion reinforced by the electric battery.

In one of these, the aphonia came on during a spell of illness in which the patient learned that a man to whom she was engaged had married someone else. The aphonia merely declared to all observers that she had been badly treated. "See," it said constantly, "what he has gone and done to me!"

During the war there were a number of cases of so-called "shell-shock" whose chief manifestation was trembling of the body or gross involuntary movements of arms or legs, or both. Most of these were cured promptly by a few relaxation exercises immediately on being received in the neurological hospital. Those who were not cured were put to bed. If in a day or so the trembling did not cease they were screened off so that no one in the ward could see them. What could not be seen was not worth having. It obtained no sympathy, and so there was no longer any reason why the "shell-shock" should not disappear, which it promptly did, and thereby the tedious isolation was brought to a close.

Once sympathy has been tasted it soon becomes an end in itself. I remember a doctor's wife who had frequent tantrums and crying spells. These led to a great deal of nursing and petting by her husband and her mother. They even necessitated her being taken to a hospital where she absorbed much more of her husband's time than he could possibly have given her were she well. In less than a week she became a brand new woman under the following treatment:

1. Isolation from her mother and husband till she had complete control of herself.

2. Assurance that if this control were not established within a reasonable time that she would have to be taken to an asylum.

3. Plain explanation to her of her conduct as an unreasonable appeal for sympathy. Pointing out to her that she was wasting her life in these tantrums and preparing the way for the disintegration of her married life. Though this "dénouement" called forth tears and protests, she told us the next day that she had resolved to get control of herself. And in a few days she did so, and in general appearance and behavior underwent a remarkable transformation which has been maintained now for over a year without relapse.

Another case in which the craving for sympathy and attention manifested itself as an end in itself rather than a compensation for a loss sustained, was the following:

A young girl was brought to the clinic because she was supposed to be possessed by the devil. The reason for this supposition was that she had weird tantrums that prevented her going to school (defense reaction), and that the feathers in her pillow were found tied together with peculiar shreds of cloth in the most remarkable fashion. How it occurred to anyone to open the pillow and discover these wonderful "manifestations" I could never learn. I suggested that the pillows be sewed up and never opened again and that if she had any more tantrums she was to be scalded down the back with uncomfortably hot water, given asafœtida and put to bed for twenty-four hours. The spells stopped and the feathers were not molested thereafter, and her schooling suffered no further interruptions from these spells.

I have seen many children whose ills were consciously fabricated, or perhaps more likely unconsciously exaggerated, for the sake of the petting and interest their imaginary sickness obtained.

Treatment of the Parataxis of Compensation.—One reason why it is possible for human beings to make these bizarre appeals for sympathy, is that they do not understand themselves and what they are doing. Unworthy motives are easily repressed into the background of one's mental life, and hence results abnormal behavior. What would disgust, if seen in others, is carried out without insight by themselves. One often only needs to know and understand in order to correct one's abnormal behavior. This is true at least of the better types of character. The lower types often refuse to coöperate, or cannot understand.

Prophylactic treatment should consist in a wider dissemination of psychological information about abnormal behavior. This will give the world in general a better insight into unworthy appeals for sympathy, and make it less likely that such appeals will be heard.

In an actual case, treatment should involve an explanation of conduct whenever the mentality is capable of understanding it. Understanding, however, is not necessary for a cure of the symptoms. One need only make them not worth while, and they will promptly disappear. When this is done there seems, at times, to be an unconscious logic at work even in the hopelessly obtuse, and for some reason or other, what is once found to be not worth having is never sought again.

CHAPTER IX

SUBLIMATION

The term "sublimation" as used in modern psychology comes from the science of chemistry. In chemistry, sublimation is one of the processes by which a salt may be purified. If a volatile salt is heated beneath a bell-jar, it vaporizes and the vapor rises to the cool dome of the jar and there recrystallizes in its pure state. In the psychoanalytic school, sublimation is a term used to indicate a change in the mode of satisfaction of desires in which an outlet is no longer sought at their previous lower levels but on what sociologically is a much higher plane. Thus, one disappointed in love is said to sublimate when, in his later life, he seeks an outlet along lines of religious activity or general social betterment. The new activity in some way stands as a symbol of the satisfaction of the former craving. The elevation, according to the Freudian school, is, however, not real but merely a masked indulgence of the same old craving. Therefore, psychoanalysts attempt by the process of analysis to seek out the fundamental craving of human nature which is ever manifesting itself in one and the same way.

According to Freud, the driving forces of human nature are the impulses. All impulses are essentially one because an impulse in itself has no quality. The source of impulsive activity is an organ of the body. All organs of the body give rise (a) to this undifferentiated impulse, (b) to a specific sexual excitant. The real driving force, according to Freud, is the sexual excitant, which, in all impulses, is ever the same. This sexual excitant, therefore, is the only thing that gives to an impulse a specific quality. All impulses have this specific quality and none other, if Freud's ideas are carried to their logical conclusion. Therefore, according to Freud no matter what man seeks or on however high a level his impulsive activity may apparently manifest itself, it is nevertheless one and the same craving for sexual satisfaction.

"By an 'impulse' we can understand, in the first place, nothing but the psychic representative of a continually flowing internal somatic source of excitement, in contradistinction to the 'stimulus' which is produced by isolated excitements coming from without. The impulse is thus one of the concepts marking the limits between the psychic and the physical. The simplest and most obvious assumption concerning the nature of the impulses would be that in themselves they possess no quality, but are only taken into account as a measure of the demand for effort in the psychic life. What distinguishes the impulses from one another and furnishes them with specific attributes is their relation to their somatic *sources* and their *aims*. The source of the impulse is an exciting process in an organ, and the immediate aim of the impulse lies in the elimination of the organic stimulus.

"Another preliminary assumption in the theory of the impulse which we cannot relinquish, states that the bodily organs furnish two kinds of excitements which are determined by differences of a chemical nature. One of these forms of excitement we designate as the specifically sexual, and the concerned organ as the *erogenous zone,* while the sexual element emanating from it is the partial impulse."[1]

Freud looks upon the tendency of sexuality to deviate to new and hidden aims as one of the most important factors in the betterment of the human race.

"The historians of civilization seem to be unanimous in the opinion that such deviation of sexual motive powers from sexual aims to new aims, a process which merits the name *sublimation,* has furnished powerful components for all cultural accomplishments."[2]

Jung conceives of the nature of impulsive activity in a somewhat different manner. According to Jung, there is only one psychic energy, the *libido* of the organism. *Libido* is to the organism what energy is to the universe. The modern concept of energy recognizes only one fundamental kinetic power, which manifests itself now as heat, now as

[1] *Three Contributions to Sexual Theory,* trans. by Brill, 1916, p. 33.
[2] *Op. cit.,* p. 41.

light, now as electricity, now as movements of the heavenly bodies, but at bottom it is all one and the same energy, and can be defined as that which moves a mass with a given velocity. So, Jung says, in all the various forms of human activity there is one and the same driving force, the *libido* of the organism. Originally, *libido* had to do with nothing but the propagation of the species, but in the course of development a certain amount of it must be transformed or deviated so as to serve in the acquisition of food, protection of the young, etc. This deviation of the primal *libido* into other channels is continuously going on in the human organism.

"The process of transformation of the primal libido into secondary impulses always took place in the form of affluxes of sexual libido, that is to say, sexuality became deflected from its original destination and a portion of it turned, little by little, increasing in amount, into the phylogenetic impulse of the mechanism of allurement and of protection of the young. This diversion of the sexual libido from the sexual territory into associated functions is still taking place. When this operation succeeds without injury to the adaptation of the individual it is called *sublimation.* When the attempt does not succeed it is called *repression.*"[3]

The Unity or Multiplicity of the Driving Forces of Human Nature.—When we come to consider whether or not the driving forces of human nature are one or many, we should recall in the first place that however varied the forms of satisfaction, there is always only one individual to be satisfied. There is, therefore, a kind of unity in the modes of satisfaction which comes from reference of all drives ultimately to the satisfaction of the one personality. This, however, does not argue for the essential unity of the modes of satisfaction, any more than the fact that all perceptions are cognized by the one ego demonstrates that there is no difference in the forms of perception. For sight and sound are channels of perception for the one individual, and yet, sight and sound are different modes of perception and cannot be reduced to one and the same thing. In the same way two desires are

[3] *Psychology of the Unconscious,* trans. by Hinkle, 1916, p. 150. Cf. also *infra,* p. 266.

cravings of the one person; but two desires may, for all that, be two different psychical entities.

In the analysis of impulses and desires that we have given, we found that there are just as many impulses and desires as there are abilities in a human being. We must, therefore, recognize a number of impulses psychologically different, and it cannot be said that any one of these is the sole driving force of human nature. The transformations of physical energy to light, sound, heat, etc., have been studied by careful experiment, and measurements have been made of the amount of energy at the beginning and end of the experiments, and this quantity of energy is found to be invariable. Nothing of this kind has been done to make Jung's hypothesis of the "libido" any more than a fanciful analogy. To substantiate it one should be able to measure the psychic energy in any one of the impulses; for example, the motor impulses and the psychic energy in the craving for knowledge, the intellectual impulse, and thus demonstrate by measurement that when one is transformed into the other no psychic energy is lost. Merely to put the question in such terms as this shows how impossible it is to reduce Jung's theory from an idle speculation to an established fact.

Concept of Sublimation.—Assuming, therefore, that we have as many impulses as we have forms of mental abilities, we may recognize two types of individuals. (1) In some characters the impulses all have a tendency to centre themselves in the ego, so that if a person is disappointed in one way of satisfying himself, he seeks another mode of attaining his satisfaction. (2) There are other characters whose impulsive drives have a tendency to lead the individual outside of himself so that if he has suffered a disappointment in some personal satisfaction, he seeks an outlet in doing something which is not merely a compensation that satisfies himself, but is a mode of activity that brings him into relation to other beings so that he is of service to them. Whenever an individual compensates for a disappointment or makes good an unsatisfactory type of behavior by doing something of value to other beings, he may be said

to sublimate. This concept of sublimation differs, evidently, from that of Freud or Jung.

There are two forms of sublimation, the social and the religious, according as the form of activity has to do with other human beings or with God. It is to be noted that there sometimes exists an analogy between the form of sublimation which is chosen and the past disappointment or form of unsatisfactory behavior. It is therefore likely that the craving which dominated the older drive is partially active in the later sublimation. It may lend to it a peculiar charm and determine that this particular form of sublimation may be chosen rather than another. It does not, however, explain why a sublimation is attempted rather than a pure compensation.

The reasons why sublimations are attempted rather than compensations are, in the first place, the blocking which terminates some form of human satisfaction, and, in the second place, a type of character or accidental influences from the environment, education, personal influence, etc., that lead an individual to seek forms of activity that involve the welfare of others rather than pure personal satisfaction.

Sublimation as an Impulse.—A moderate experience with human nature will lead one to recognize the difference which is pointed out between compensators and sublimators. Some people never sublimate and never can be persuaded to seek a form of activity which does not terminate in their own self-aggrandizement. The difference is just as marked as the difference which exists between people who always attempt to compensate by a new form of activity and those who have no marked tendency to do this but simply mourn or worry over an impossible situation. There are idealistic types of individuals who are continually dreaming of social betterment, political reforms, religious activities, etc. It is worth while noting here that when we say that an individual manifests a tendency to sublimate and not a tendency to compensate, this does not mean that compensators have no tendency to sublimate; and sublimators no tendency to compensate; but only that some individuals manifest sublimating tendencies much more strongly than they do compensating ten-

dencies. In fact, it is to be taken as a working hypothesis that all of the tendencies of the worst of us are in the best of us, and *vice versa.*

Parataxic Sublimations.—Many sublimations are perfectly normal and healthy. There are others, however, that are unreasonable drives that lead to the detriment of the individual. Whenever a person is afflicted by a drive that will lead to no positive advantage either to himself or to the human race, we may conclude that he is suffering from some kind of mental abnormality. Thus, for instance, shortly after the close of the World War a young man with a good education and a lucrative position that gave promise of still further advancement, came to me mainly because of a sense of inferiority that he had experienced in his dealings with others. He also had a drive which he looked upon as a noble and worthy tendency. He had heard of some kind of legion that was being enlisted in Europe to fight the Bolsheviki and he felt called upon to go over and join this battalion and do battle against forces that were making for the dissolution of human society. I naturally suspected that a drive of such nature was in some manner connected with the feeling of inferiority, and this suspicion was confirmed. His feeling of inferiority went back to childhood. He was somewhat weaker than other children and never could make much use of athletic sports, but nevertheless had a craving to excel. He was further very sensitive about his personal appearance. He thought his nose was excessively long, and that as soon as he saw anyone they would remark the length of his nose, and that, therefore, whenever he met other individuals he was at a distinct disadvantage. He had had other impulses besides the anti-Bolsheviki drive, such as to make good by study, etc.

As said above, there is often some kind of analogy between the complex and the special form of sublimation sought. It is to be noted that this young man was sensitive about his nose. He was not a Jew, but he had been frequently taken for a Jew. He, therefore, adopts a form of sublimation in which he sacrifices his life and his opportunities to combating the Jews in the form of Bolshevism. I explained to the young man the mechan-

isms that the history of his life and his present tendencies indicated were at work in his mind. I also told him to read Alfred Adler's *Neurotic Constitution.* He came back, a few days after I had given him Adler's work, laughing, tremendously elated, thoroughly satisfied that he understood himself, and entirely free from any design to go over to Russia and fight the Jews.

Many reform movements, while good in themselves, will take on, in some individuals, the form of a parataxic sublimation. I have listened from time to time to ardent militant suffragettes, and have been very interested to find out later that a number of these excited Amazons had had unhappy love affairs; either they were married and had very unfortunate experiences with their husbands, or perhaps, had never married because of some unhappy incident, and therefore, they rose up in protest against all male members of the species and strove to work for the betterment of society by political reforms in which woman will finally be elevated, not only to her true sphere, but will triumph over the cruelty and stupidity of man.

Treatment of Parataxic Sublimations.—The treatment of parataxic sublimations has already been indicated. We must, in the first place, look for some form of pathological association with a complex; that is to say, with a past unhappy or unfortunate, emotional experience. We must try to analyze the source of the feeling of inferiority which leads to an over-compensation or sublimation, not along lines of rational adjustment, but in a groove dictated by the pathological association. We must reason with such idealists, at times, that five cents actually gained is better than to dream of the possession of millions. We must attempt to direct a good impulse into rational channels. But, after all, the sublimator is much more likely to be a useful member of society than the mere compensator or mourner. We must remember that a great deal of the energy of important moves for social welfare comes from these hidden complexes, and this energy needs only to be rationally directed in order to accomplish a work for society that would otherwise be left undone.

Normal Sublimations.—These natural impulses may, very often, be made to conform to the dictates of reason, and in this

way a valuable character trait may be made use of in social service or religious activity for the welfare of the human race. Many conversions or sublimations have in one way or another been brought about in a human being with an inadequate adjustment to life. The following editorial from the *Washington Post*, entitled "A Life Redeemed," gives a good example of a useful sublimation. The special form of the sublimation is here, as is often the case, clearly associated with the complex in past experience.

"It was as Lena Cuen, a girl of twenty, that the woman, who afterward became the bane of the life of New York policemen, left her home in Troy, twenty years ago to become a stenographer. The young girl fell a victim to the gay life of the tenderloin, took the name of Mary Goode, and became a notorious character, paying blackmail to policemen and gunmen.

"Some years ago Mrs. Goode reformed. She did not content herself with leading a respectable life, but threw all her energy, time, and money to the reclaiming of girls who had gone astray. Upon her wall she hung this motto: *What have I done this day to help others and make the world better?*

"Army officers in Europe dismissed in disgrace for some seemingly unpardonable offense have won redemption through the European war. They have won back their place among their fellows as 'officers and gentlemen.' Mary Goode redeemed herself in like manner. The last years of her life were those of a noble woman, ever ready to do good and to help her fallen sisters. She more than repaid any debt owed to society. Others who have never sinned, except through omission, may find the balance even at the end, but the balance sheets of Mary Goode showed more on the credit than on the debit side when her books were closed by death."

Sublimations approach rational readjustments, but there is a big difference between a sublimation and a rational readjustment. Very frequently the sublimation runs counter to the dictates of reason, as in the example of the young man who wished to go to Russia and fight the Bolsheviki. On the other hand, a tendency to sublimate may, of itself, be inadequate as a

drive to action, and may merely be a plan which the unconscious suggests, and which is taken up, considered, weighed carefully, and finally adopted or supplanted by another plan which seems more in accordance with the dictates of reason. Those who would make no mistake in the management of themselves and their affairs should never yield to the blind drive to sublimate, but should mold their lives by rational adjustments and readjustments to the difficulties of life.

PART V

PSYCHOANALYSIS AND PSYCHOTHERAPY[1]

[1] For a fair exposition of the psychoanalytic theories see Poul Bjerre, *The History and Practice of Psychoanalysis*, trans. Eliz. Barrow, 1916, p. 294. J. H. van der Hoop, *Character and the Unconscious. A Critical Exposition of the Theories of Freud and Jung*, trans. by Eliz. Trevelyan. London, 1923, pp. viii + 223. John T. MacCurdy, *Problems in Dynamic Psychology*, Cambridge and New York, 1923, pp. xv + 383. For a somewhat different type of psychotherapy see Dejerine and Gauckler, *The Psychoneuroses and Their Treatment by Psychotherapy*, trans. by S. E. Jelliffe, 2d ed., Phila., 1915, pp. xii + 395. Paul Dubois, *The Psychic Treatment of Mental Disorders*, 5th ed., New York, 1908, pp. vi + 466.

CHAPTER I

FREUD

When a student attempts to get his first insight into psychoanalysis, he is likely to seek a psychological background which will enable him to consider the psychoanalytic theories from a scientific point of view. This, however, is impossible. Psychoanalysis was not developed by psychologists, but by psychiatrists, and there has been no systematic attempt to work out a psychological foundation for any of the psychoanalytic theories.

Origin of Psychoanalysis.—Psychoanalysis had its origin in the treatment of neurotic patients. It is a method, not a philosophical or a psychological theory. In fact, Freud specifically rejects any attempt to develop a psychological foundation. "Psychoanalysis," he says, "has never claimed to give a perfect theory of the human psychic life, but has only demanded that its discoveries should be used for the completion and correction of knowledge gained elsewhere."[2]

In fact, he criticises Adler for having attempted to be psychological when he continues: "But Alfred Adler's theory goes far beyond this goal. It pretends to explain with one stroke the behavior and character of men as well as their neurotic and psychotic maladies."[3]

If, therefore, we are going to understand psychoanalysis, we must go back to its beginning as a method of therapeutic procedure.

Psychoanalysis grew out of the attempt by Breuer and Freud to treat hysterical patients by hypnosis. They repeatedly found that a definite hysterical symptom could be traced back to some emotional incident with which the symptom was associated. They attempted to discover this incident by hypnosis and they found, to their great surprise, that when it was un-

[2] *History of the Psychoanalytic Movement*, p. 41.
[3] *Loc. cit.*, pp. 41, 42.

covered the patient was cured. "The special hysterical symptoms disappeared," they said, "at once, to return no more when we succeeded in awakening to perfect clarity the memory of the causal incident and along with it to make the patient live over again the accompanying emotion, and have him describe the incident in detail, and express the emotion in words."[4]

They give a number of examples of accidental occurrences in which some physical or psychical phenomenon was associated with an emotional incident, and was perpetuated and complicated later in a full-blown hysteria, or perhaps lived on as an isolated symptom.

"A girl is watching in painful anxiety at the bedside of one who is sick. She falls into a twilight state, and experiences a frightful hallucination while her right arm 'goes to sleep,' as it hangs over the edge of the sofa. From this there develops a paresis of the arm with contracture and anæsthesia. She wants to pray, but the words will not come to her. Finally, she manages to utter a child's prayer in English. Later, there developed a serious, highly complicated hysteria during which, for a year and a half, she did not understand her mother tongue, and spoke, wrote, and understood English only."

"A very sick child finally goes to sleep. The mother strains every effort to keep herself quiet that she may not wake the child. Precisely because of this resolve, she makes ('hysterical counterwish') a snorting noise with the tongue. This happens again on another occasion when she wants to keep herself absolutely quiet. From that there develops a tic which accompanies every excitement for years as a kind of snorting noise made by the tongue."[5]

The theory which Breuer and Freud propounded to account for the perpetuation of the symptom was based on the fact that every situation which is emotionally toned normally results in various emotional expressions, in a bodily and mental resonance that constitutes the normal outflow of emotional life. When, however, for some reason this emotional expression is blocked,

[4] Breuer und Freud, *Studien über Hysterie*, 1895, p. 4.

[5] *Loc. cit.*, pp. 2, 3.

the energy remains pent up in the individual, and is continually striving to find an outlet. If now the memory of the past incident is called to mind, and the patient reproduces the whole situation and abreacts, that is, lives out the emotional expression, the repressed ideas lose their potency, and the patient is cured.

Breuer took no more part in the development of psychoanalysis after the publication of this work in joint authorship with Freud. Freud continued his investigations, and whereas he and Breuer had made use of hypnosis as a means of finding out what emotional incidents of the past were responsible for the condition, Freud attempted a new method which would be applicable to all patients. This was desirable because hypnotism may be used with relatively few, for not everyone can be hypnotized. The new method developed into the technique of psychoanalysis.

It is interesting to note that the difficulty lying at the basis of the hysterical symptoms was never found by Freud to be a recent occurrence, but something long past. This was the *general* experience of himself and Breuer in the earlier study. Thus, they wrote: "Quite frequently (*ganz häufig*) there are events dating back to childhood that develop a more or less serious disease-symptom throughout all the following years."[6]

Freud, with his usual tendency to generalization, changed the "quite frequently" of Breuer into "always," and found, moreover, that the incident not only was one of the past, but went back to the earliest days of childhood. "As one of the latest achievements of psychoanalysis we have lately been admonished to put the actual conflict and the cause of the illness into the foreground of analysis. This is exactly what Breuer and I did in the beginning of our work with the cathartic method. We guided the patient's attention directly to the traumatic scene during which the symptom had arisen, tried to find therein the psychic conflict and to free the repressed effect. We thus discovered the procedure characteristic of the psychic processes of the neuroses which I later termed regression. The associations of the patients went back from the scene

[6] *Loc. cit.*, p. 2.

to be explained to earlier experiences, and this forced the analysis, which was to correct the present, to occupy itself with the past. This regression led even further backwards. At first it went quite regularly to the time of puberty. Later, however, such failures as gaps in the understanding tempted the analytic work further back into the years of childhood which had, hitherto, been inaccessible to every sort of investigation. This regressive direction became an important characteristic of the analysis. It was proved that psychoanalysis could not clear up anything actual, except by going back to something in the past. It even proved that every pathological experience presupposes an earlier one which, though not itself pathological, lent a pathological quality to the later occurrence.'"[7]

Freud's Therapeutic Procedure.—Let us now consider just what Freud's technique is in a psychoanalytic treatment. Hitschmann, one of his students, gives an account of just what takes place: "Freud, instead of hypnotizing his patient, asks him to allow his mind to wander and give expression to everything that comes into it, for it is by the patient's associations that he hopes to get back to his complex, that is, the buried emotional incident which is causing his trouble. Freud's idea is that the patient's difficulty will finally find expression if the mind is only allowed to wander and express every association that comes up before him, and every memory that rises to consciousness.

"In order to strengthen these associations, Freud uses the following outside means of assistance: He has the patient recline comfortably on a couch while he sits on a chair behind and outside his line of vision. He does not insist upon the eyes being closed, and avoids any touch, as well as every other procedure which might lead to hypnotism. Such a séance goes along like a conversation between two similarly awake persons of whom one is relieved of every muscular tension and every distracting sense impression, which might disturb the concen-

[7] *The History of the Psychoanalytic Movement*, Sigmund Freud, trans. by A. A. Brill, New York, 1917. "Nervous and Mental Disease Monograph," Series No. 25, pp. 3, 4.

tration of the attention upon his own mental affairs. Before he proceeds to details, he urges them often, for several sessions, to sketch a general picture of their whole illness and most intimate family and life surroundings, to tell him everything which comes into their heads, whether they think it important, irrelevant, or nonsensical. With special emphasis, it is asked of them that no thought or association be omitted from the communication because this telling might be shameful or painful.''[8]

The method of free association here described is associated with the method of dream analysis, of which we have already spoken.[9]

Freud also thinks that he can interpret various little facts and incidents of the interview as having a definite meaning. He speaks of them as symptomatic acts. Thus, if the patient comes late or absents himself entirely, it indicates resistance to the analysis. Unmotivated laughing betrays the fact that the patient sees the truth of the analytic interpretation of his symptoms though he does not confess it, etc.

After the analysis has proceeded for some time, the physician, more or less suddenly, acquires an insight into the meaning of the patient's symptoms. He must not suppose that the patient also has made the discovery at the same time. The novice[10] is inclined to explain the matter to the patient, and lay bare the solution of his hysteria. This, however, is a mistake. A skilful psychoanalyst leads the patient on to see the solution himself. If you explain to the patient the symptoms without his having made the discovery, you do not overcome his resistance. The very aim and object of psychoanalysis is to overcome this inner resistance (Verdrängung). It is a force,

[8] Freud's *Theories of the Neuroses.* Hitschmann, trans. by Payne, 1921, p. 195.

[9] Cf. *supra,* p. 37.

[10] Not only novices apparently do this but some psychoanalysts who have long practised the science and have written lengthy works on the subject. I remember one of my patients telling how a certain psychoanalyst, after a little analysis, briefly explained her symptoms, and when she did not agree with him, shook his fist, and insisted that she must take his solution.

according to Freud, which prevents the patient from seeing himself as he is, and which must be overcome in order to effect a cure. At a certain period in the analysis, insight is assisted by an explanation of the psychoanalytic theory. This explanation is exemplified by facts that have come out in the course of the analysis, and so the patient is enabled to see the connections for himself, and when this is done in typical cases, a cure is effected.

Analysis, however, is not the only factor in bringing about a cure. According to Freud, no cure is ever wrought except through the mechanism of transfer. The Freudian concept of transfer is based upon a theory that underlies all his writings. The driving force of human nature is libido. With Freud, this is always sexual. The primitive fixation of the libido is on the self, leading to autoeroticism. The second fixation of libido, according to Freud, is on individuals of the same sex, and this, in normal development, is followed by a heterosexual fixation of the libido.

In spite of these stages in the development of affection, Freud also holds that the original fixation of every boy's affections is his mother, and there is an inner hatred and opposition to the father. If the mother is dead, someone acts as a surrogate. At all events, the original fixation is normally in the family. All other affection is the transfer of this original, essentially, but not consciously recognized incestuous love. When the patient suffers a mental breakdown, develops an hysteria, or some other form of psychoneurosis, it is always associated with inadequate fixation of the libido. The physician steps in as the one who helps, and help is possible because the original love which has no longer a place of fixation is transferred to him. In order that the treatment may be successful, this transfer must last throughout its whole course. Sometimes a successful treatment is interrupted by positive transfer being changed into negative, that is to say, in common parlance, by affection giving way to hatred or dislike. As soon as negative transfer occurs, the power of the physician to help is ended, and will not return until the advent of a new positive transfer.

With the end of the treatment, the transfer must be broken. The physician must cease to be a friend and become as it were a stranger to his patient again. When this takes place, the patient is free and is no longer dependent upon his doctor.

Critique of the Freudian Position.—Though Freud maintains that psychoanalysis is not psychology, but a method of treatment, he not only presents us with a technique of therapeutic procedure, but also demands our assent to fundamentally psychological and philosophical concepts. We may ask ourselves, therefore, in the first place, whether psychoanalysis is a valuable addition to our methods of mental treatment; secondly, whether the appanage of psychological and philosophical concepts is based upon well-established scientific facts.

I. Psychoanalysis as a Method.—Mental disorders at the present time are usually divided more or less roughly into two great classes: Organogenic and psychogenic. We perhaps owe to Freud, more than we realize, the development of our present knowledge of the large class of psychogenic mental diseases. For before his day, the tendency was certainly to look upon everything as some kind of physical disease of the central nervous system. Even when nothing definite could be pointed out, the assumption was made, though its authors did not realize its metaphysical character, that a group of brain cells were not functioning properly. It was, however, impossible to treat these brain cells, and the assumption had no therapeutic value whatever. But Freud made us realize that a great many mental disorders are due to mental factors, and can be treated by the proper technique of psychotherapy. This is a great service, and one that must not be underestimated. It has, however, led in some quarters to an overaccentuation of the mental in the etiology not only of the psychoses, but also of purely physical conditions. An example of the extreme tendency is given in the following quotation from White:

"Aside, however, from the therapeutic attack upon actual situations of maladjustment, this concept (of organic inferiority) is of value in getting at the inner meaning of symptoms, bodily as well as mental. Under its guidance, we are inquiring

for the first time into the meaning of some diseases from the point of view of the strivings of the individual as a biological unit. Can we, for example, express certain diseases in terms of partial libido strivings? . . . Can a carcinoma of the stomach be understood in terms of nutritional libido? a rectal tabetic crisis in terms of anal erotic? a pulmonary tuberculosis in terms of respiratory libido? a tumor in terms of muscle libido? And so on through the whole category.''[11]

Whatever may be said of the relation of character and its accompanying physical characteristics to various forms of physical disorder, it is not likely that the treatment of organic conditions is going to be aided by any system of subdividing the libido into respiratory, nutritional, and other factors.

Granting the assistance that psychotherapy has given to the science of psychiatry, we may ask ourselves whether it cures all forms of mental disorder. This question can only be answered in the negative. It does not. Some have maintained that what it does is to enable us to understand mental disorders and not to cure them. However, there can be no doubt that in some cases, it does bring about a cure. It cannot, however, be regarded as a panacea for all mental difficulties even if we should take ''all'' as referring here to those of psychogenic origin.

Psychoanalysis has several limitations. First, it is limited by the mentality of the patient. No matter what the patient's disorder, he is not a good subject for psychoanalytic treatment unless he is of good intellectual ability. The stupid cannot be psychoanalyzed. Secondly, psychoanalysis is limited by the time factor. According to Freud, you must spend hours every week for months before you can work a cure. If this is the case, very few patients can be subjected to a psychoanalytic course of treatment. And in the third place, it is limited by the type of disorder. Not all psychoneuroses are amenable to treatment. I witnessed the utter failure of psychoanalysis in the treatment of the war neuroses, and a little later, I had the pleasure of seeing and taking part in the suggestive method of therapy

[11] Wm. A. White, *Mechanisms of Character Formation*, New York, 1916, pp. 266, 267.

which was made use of with such brilliant success in the American neurological hospitals in France.

In my experience, psychoanalysis is of particular value in the parataxes of anxiety in civil life. Wherever there has been established in the past a pathological association between some emotional incident and abnormal behavior, psychoanalysis is of distinct help. But where the relation to a complex in the past is not so marked, and the conflict of the present is the dominating factor, psychoanalysis may help, but it does not cure. It is particularly inefficient in the treatment of the manic-depressive psychoses, but no other treatment of these disorders has any distinct advantage over psychoanalysis.

Mere catharsis in my experience is often inadequate to effect a cure. It is necessary that one should not only analyze, but, as Jung says, one must also synthesize in the sense that he not only puts together the fragments of the patient's past experience, but also enables him to work out a harmonious adjustment of his inner drives with the problems and opportunities that confront him.

II. Theoretical Questions in Psychoanalysis.—*A. The Origin of all Neuroses in Childhood.*—In my own attempts at psychoanalysis, I have not been able to see for myself every single mental disorder traced back to infantile origins. I can say, however, that I have found some cases in which this is true. The Freudians will maintain that I have not seen the origins of all conditions in childhood because of the inadequacy of my analyses. This point need not be settled. I would not maintain that my analyses have been adequate, but I have found that as far as therapeusis is concerned, it is not necessary to trace the symptoms back to childhood in order to effect a cure. Many of my cases have seemed to have their explanation in conflicts of the present, and not of the past. Others have had the same experience, and I think it quite likely that Freud's tendency to generalize has here again obtained the upper hand, and his conclusion is not based on sufficient evidence, but is really a reaction of his own character.

B. Reason for the Varying Values of Catharsis.—I have repeatedly attempted to find out whether or not catharsis, that is to say, the unburdening of the past, has any therapeutic value, and, as a result of these attempts, I have come to the conclusion that in many cases it has some value, particularly in incipient conditions. It is very likely that in such cases it relieves tension and often prevents a further pathological development. It is of particular value when a pathological association is discovered. The patient seems to have an insight: Is that what's been troubling me? And understanding the mechanism, he is able to control it. Unburdening is often inadequate, however, and the reason for this is to be sought in the condition of the patient and not, as Jung thought, in the lack of adequate *rapport* with the physician. If the present position of the patient in life is an impossible one, it can be readily understood that unburdening the past will not clear up the present. In such cases, one must not only unburden, but also find a present solution for the patient's difficulties.

C. Freud's Concept of the Libido.—Freud conceives of the libido as essentially sexual, and looks upon the motive of conduct in all human activity as a sexual drive. Is it psychologically true that the impulses of human life are to be reduced to one? The analysis that we have given above of impulsive activity brings out the concept that every human ability has associated with it a special drive that constitutes a specific impulse. Thus, we have eyes and a curiosity to see, a power to move, and an impulse to exercise, etc. The impulse to look can be no more identified with the drive to motor activity than the muscles of the body can be confounded with the retina. They are two different things. If we have multiple impulses, then Freud's theory of the libido is untenable.

What, now, is to be said of the stages of development of the sexual impulse from the narcissistic through the homosexual to the heterosexual? I have found no evidence of a universal homosexual drive in all individuals, nor can one conclude from the fact that in the first stage of uterine development, all human beings are hermaphrodite, that, therefore, in the extrauterine

life there must be a psychological correlate of the hermaphroditism of the embryo. It is true, however, that infants are selfish, and that some adults attain to an unselfish type of existence. If, therefore, we term the centring of affection upon oneself narcissism, all human beings are narcissistic at one period of their life and the normal course of development is to pass from infantile selfishness on to a realization of the necessity of sacrifice. Narcissism gives way normally to altruism. This is true, but it is not essentially Freudian.

D. Problem of Transfer.—If the Freudian concept of transfer is correct, human affection must be a continuous living entity, never dying and always seeking an object of fixation. The child's first love is his mother. If his mother dies, his love for her does not cease to exist. When later on the child loves someone else, it is the same love, according to Freud, that he bore his mother that has never died, but continues to live, and now fixates itself on another person. Is this true? Probably not. Affections, feelings, emotions, are no more continuous in our mental life than sensations; they come and they go. When a new object of affection presents itself, new affections arise; it is not the same affection that merely fixates itself on something else. The *power* to love abides, but the continuity of the function does not imply the continuity of its act. When the eye looks first at one scene, and then at another, it is the same eye, but there are two scenes, and two sensations. When a human being loves one person and then another, there are two objects and two affections.

According to the Freudians, the Œdipus complex and the Electra complex dominate the family life. Œdipus, as is well known, killed his father and married his mother. Electra incited her brother to kill her mother. And so, according to Freud, every son hates his father, and every daughter hates her mother. Is this true even as a subconscious condition in the child's mind? I have several times found that it is so. Such facts do not allow one to pass from "sometimes" to "always." There is frequently a natural jealousy between mother and daughter, and a natural hatred between son and father. I doubt, however,

that it dominates family relationships and determines the activities of children and parents. It is at most a subsidiary factor. But, according to Freud, the Œdipus complex is not only the dominant factor in family relationships, but is also at the bottom of society, morality, and religion. It is a keen and interesting speculation and is worthy of being presented here, if only as a sample of how psychoanalysts disregard all history and factual experiences.

"The Darwinian conception of the tribal horde," he writes, "does not, of course, allow for the beginning of totemism. There is only a violent, jealous father who keeps all the females for himself and drives away the growing sons. This primal state of society has nowhere been observed. The most primitive organization we know, which to-day is still in force with certain tribes, is associations of men consisting of members with equal rights, subject to the restrictions of the totemic system, and founded on matriarchy, or descent through the mother. Can the one have resulted from the other, and how was this possible?

"By basing our argument upon the celebration of the totem, we are in a position to give an answer. One day, the expelled brothers joined forces, slew and ate the father, and thus put an end to the father horde. Together, they dared and accomplished what would have remained impossible for them singly. Perhaps some advance in culture, like the use of a new weapon, had given them the feeling of superiority. Of course these cannibalistic savages ate their victim. This violent, primal father had surely been the envied and feared model for each of the brothers. Now they accomplished their identification with him and each acquired a part of his strength. The totem feast, which is perhaps mankind's first celebration, would be the repetition and commemoration of this memorable, criminal act with which so many things began, social organization, moral restrictions, and religion."[12]

Goldenweiser, an experienced anthropologist, has subjected Freud's theory to the following criticisms:

(1) "Totemic sacrifice is a phenomenon practically unknown to ethnologists."

[12] Freud, *Totem and Taboo*, trans. by Brill, New York, 1918, pp. 233–34.

(2) "The idea of a primitive Cyclopean family is itself a figment."

(3) "The eating of the father by the patricidal brothers is a notion which doubtless would have met with derision in the aboriginal fraternity itself. . . There has been some ceremonial eating of man, victims, as in Polynesia, of a war raid; here and there, human flesh was used in cases of severe famines. But we do not hear of the eating of relatives."

(4) "Suppose the original tragedy, the patricidal act of the brothers, had actually taken place with all the immediate psychological consequences assumed by Freud. But by what means can these facts be brought into relation with those subsequent historic phenomena of society, religion, morality, and art, the root of all of which Freud points to in that ancient enactment of the Œdipus complex in a tragic social setting?"[13]

The capital sin of psychoanalysis, after all, is the neglect of the historical and the ignoring of empirical investigation. This baneful influence has disseminated itself throughout a considerable number of psychiatrical investigations. But psychiatry can never become a science until it is willing to subject its facts to critical investigation, and when this is done, much of the psychoanalytic theorizing will be recognized as ingenious but unwarranted speculation. Freud's answer to the question raised by Goldenweiser is the mass psyche. "It can hardly have escaped anyone that we base everything upon the assumption of a psyche of the mass in which psychic processes occur as in the psychic life of the individual. Moreover, we let the sense of guilt for a deed survive thousands of years, remaining effective in generations which could have known nothing of the deed.

"Without the assumption of a mass psyche, or a continuity in the emotional life of mankind which permits us to disregard the interruptions of psychic acts through the transgression of individuals, social psychology could not exist at all."[14]

A consideration of the concept of the mass psyche is best deferred until after we take up a study of the psychoanalytic theories of Jung.

[13] A. A. Goldenweiser, *Early Civilization*, New York, 1921, pp. 396-97.

[14] *Totem and Taboo*, pp. 259, 260.

CHAPTER II

JUNG

Carl Gustav Jung was originally a disciple of Freud, and learned psychoanalysis from the master. In fact, Freud was so impressed by his young disciple that, as he tells us in his *History of Psychoanalysis,* he wished to make him the head of the psychoanalytic movement, and to retire himself from the active leadership. Jung, however, was more than a disciple. He was an original thinker, developed theories of his own, and opened up a channel for a new stream of psychoanalytic conceptions.

About the time that Jung associated himself with the movement, a distinguished psychiatrist, Bleuler, became interested in psychoanalysis. Jung and Bleuler extended the field of psychoanalytic interpretation and therapy. Freud himself dealt at first with those minor forms of mental disorder known as the psychoneuroses, and particularly with hysteria. Jung and Bleuler attempted to interpret the major psychoses and treat them by means of the new concepts and principles of therapy. This led, very soon, to a disagreement with Freud. Freud wished to regard everything as due to purely mental causes. Bleuler and Jung recognized in the etiology of dementia præcox, for instance, not only a psychogenic, but also a toxic factor. According to Jung, if there is no toxic or organic factor, dementia præcox cannot be distinguished from hysteria, for then each disorder would have the same etiology, and if the same etiology, why not the same course and symptoms?

Concept of Libido.—This is not the only difference that developed between Jung and Freud. Jung formulated a very different concept of the libido. With Freud, the libido drive is always fundamentally sexual. With Jung, the libido is to be compared with energy. In itself, libido is not essentially any particular type of impulsive drive, any more than energy is either light, sound, heat, electricity, or gravity. Libido is a

universal force, manifesting itself in various ways under various circumstances.

"A fleeting glance at the history of evolution is sufficient to teach us that countless complicated functions to which to-day must be denied any sexual character, were originally pure derivations from the general impulse of propagation. During the ascent through the animal kingdom, an important displacement in the fundamentals of the procreative instinct has taken place. The mass of the reproductive products, with the uncertainty of fertilization, has more and more been replaced by a controlled impregnation and an effective protection of offspring. In this way, part of the energy required in the production of eggs and sperma has been transposed into the creation of mechanisms for allurement and for protection of the young. Thus, we discover the first instincts of art in animals used in the service of the impulse of procreation, and limited to the breeding season. The original sexual character of these biological institutions became lost in their organic fixation and functional independence. Even if there can be no doubt about the sexual origin of music, still it would be a poor unæsthetic generalization, if one were to include music in the category of sexuality. A similar nomenclature would lead us to classify the cathedral of Cologne as mineralogy because it is built of stones. It can be a surprise only to those to whom the history of evolution is unknown to find how few things there are really in human life which cannot be reduced in the last analysis to the instinct of procreation. It includes very nearly everything, I think, which is beloved and dear to us. We spoke just now of libido as the creative impulse, and at the same time we allied ourselves with the conception which opposes libido to hunger in the same way that the instinct of the preservation of the species is opposed to the instinct of self-preservation. In nature, this artificial distinction does not exist. Here we see only a continuous life impulse, a will to live which will attain the creation of the whole species through the preservation of the individual."[1]

[1] Jung, C. G., *Psychology of the Unconscious*, trans. by B. M. Hinkle, 1921, p. 80.

The Collective Psyche.—Libido is the vital force of the organism. It is also the vital force of the world, the collective psyche from which individuals are differentiated and budded off in the course of evolution. It thus bears a resemblance to the pantheistic concept of divinity. The existence of a collective psyche really follows from the assumption of a universal libido. Jung, however, when he sought to find a reason for it, attempted to prove its existence from the fact that all men have a similar central nervous system which must have everywhere a similar function. He then concluded that back of the "collective function" there must be a collective psyche.

"The universal resemblance of brains leads us then to admit the existence of a certain psychic function identical in itself in all individuals. We shall call it the collective psyche. It deserves to be divided into two factors: The collective spirit and the collective soul." (In a footnote, Jung says: "By collective spirit, I understand the fact of collective thinking, by the collective soul, the fact of the collective feeling, and by the collective psyche, the ensemble of the collective psychological function.") "Insofar as there exist differences corresponding to race, tribe, and family, there exists also a collective psyche limited to race, tribe, and family, and whose plane is higher than that of the collective 'universal psyche.' "[2]

The Unconscious.—This concept of the libido led to a rejection of Freud's concept of the unconscious, and its replacement by another. According to Freud, the unconscious contains those elements and only those that have sometimes been a part of the personal consciousness but were suppressed by educational and various environmental influences. It harbors nothing but what was at one time a personal experience of the individual.[3] But according to Jung, "it comprehends not only suppressed elements, but also all the psychic elements which have not attained the level of consciousness."[4]

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[2] Jung, C. G., "La Structure de l'Inconscient," *Archives de Psychologie*, 1915, XV, p. 158.

[3] Freud seems to have modified this concept in his *Totem and Taboo*.

[4] *Loc. cit.*, p. 153.

What are these elements that have not attained the level of consciousness? They are the various activities of the collective psyche. The individual, therefore, has among his psychic elements not only personal experiences, but also activities that are common to all the races of the earth that now exist or ever have existed. These activities are not personal nor in the strict sense of the word inherited, but are the workings of the pantheistic libido that dominates everything, and drives individuals and the race to ends of which they are unconscious and to a goal that remains unseen.

The Individual.—Is there any place for the individual in the philosophy and psychology of Jung? Yes. The individual is a principle that is opposed to the collective psyche, and it is from a conflict between the individual and the collective psyche that the psychosis finds its origin. "The individual is made manifest partially as a principle which decides on the choice and assigns the limits of the elements adopted (from the collective psyche) as personal.

"The individual is the principle which renders possible, and forces, if necessary, a progressive differentiation of the collective psyche. The individual is made manifest partially as an obstacle to collective production and as a resistance to collective thought and feelings."[5]

The psychosis is a regression of the individual back towards the primitive stage of the collective psyche. Ontogeny, according to Jung, is the recapitulation of phylogeny, not only in embryology, but also in the mental development of the individual. Furthermore, the mind, in becoming insane, retraces in reverse order the stages of development of the race.[6]

Regression.—Regression with Jung means much more than with Freud. According to Freud, the individual regresses to the infantile level. According to Jung, the regression is not only to the infantile level, but also to the primitive stages of the phylo-

[5] *Loc. cit.*, p. 128.

[6] Cf. *Psychology of the Unconscious, ut supra*, p. 14.

genic levels of our mental life. And yet there is an analogy between Freud and Jung. The child's life is like that of the savage because of the principle that ontogeny is the recapitulation of phylogeny.

Freud attributes the modifications that Jung introduced into psychoanalytic theory to a desire to get rid of the objectionable features of psychoanalysis. "All the changes which Jung has perpetrated upon psychoanalysis originated in the intention of setting aside all that is objectionable in the family complexes, in order that these objectionable features may not be found again in religion and ethics. The sexual libido was replaced by an abstract idea of which it may be said that it remained equally mysterious and incomprehensible alike to fools and to the wise. The Œdipus complex, we are told, has only a 'symbolical' sense, the mother therein representing the unattainable which must be renounced in the interests of cultural development. The father who is killed in the Œdipus myth represents the inner drive from whose influence we must free ourselves in order to become independent. . . In place of the conflict between erotic strivings adverse to the Ego and the self-assertions, we are given the conflict between the 'life-task' and the 'psychic laziness.' The neurotic guilty conscience corresponds with the reproach of not having put to good account one's life-task."[7]

Freud is evidently chagrined at the independent attitude of his disciple. There seems to be no real evidence that Jung is trying to render psychoanalysis less offensive to pious ears, for, as a matter of fact, although theoretically, he accentuates the non-sexual character of the libido, he is continually nosing around for sexual interpretations, and seems to be peculiarly delighted when he thinks he has found them. As far as his analyses are concerned, his acts belie his words, and, apparently, he is never satisfied until he has found a sexual interpretation of the phenomena he is studying.

Therapeutic Procedure.—The result of Jung's revolt from Freud was a difference in therapeutic procedure, far more fun-

[7] *History of the Psychoanalytic Movement*, p. 54.

damental than his addition of the method of investigating the unconscious by the association experiment, to the technique of analysis.[8]

In an article in the *British Journal of Psychology*,[9] Jung has given us an outline of his therapeutic philosophy and procedure. He starts with the concept of the psychic trauma as did Breuer and Freud. The psychic trauma, sometimes spoken of as an emotionally toned incident, or the mental shock, lies at the basis of the psychoneurosis, according to Jung, and is effective, not because it is a shock, but because it leads to a dissociation of a certain element of the mental life from the remainder of the personality. By this he means that there is some incident shut out from the patient's mind that he does not call up by associative memory, and which he does not, perhaps will not, consciously contemplate. Here Jung and Janet are in agreement.

The question now arises: How does it happen that "catharsis," that is to say, the mere conscious recall of the incident and living through it in detail, cures the patient at times, and at other times does not? According to Jung, rehearsing the experience is of no value in itself. When it is of value, it helps because it establishes a relationship between the personality of the patient and the physician. The physician, by his presence, lends a special aid to the patient, and it is this help which enables him to face the complex and overcome the neurosis. "The rehearsed experience of the traumatic moment can reintegrate the neurotic dissociation only when the conscious personality of the patient is so far reënforced by the relationship to the physician that he is consciously able to bring the complex that has become autonomous, once more under the control of the will."[10]

The therapeutic value of analysis does not lie, as Freud thought originally, in the uncovering of anything. The analysis places the patient *en rapport* with the physician, and enables the physician to understand the patient and by the insight so

[8] Cf. *supra*, p. 38.

[9] *British Journal of Psychology*, Medical Section, 1921, II, pp. 13–22. "The Question of the Therapeutic Value of Abreaction," C. G. Jung.

[10] *Loc. cit.*, p. 16.

acquired to lead him on to a synthesis of the discordant forces in his psyche.

Both Jung and Freud accentuate the importance of transfer. But here again Jung's concept differs from that of Freud. "The phenomenon of transfer is inevitable in every fundamental analysis, for it is absolutely imperative that the physician should get into close touch with his patient's path of psychological development. Thus only can the physician take into himself the psychological contents of the patient so that his reactions gain an effective contact. One could say that in the same measure as the doctor receives into himself the intimate material of the patient, he himself enters as a figure into the psyche of the patient. I say 'as a figure,' by which I mean, that at first he is seen by the patient not at all as he is, but, more or less, he takes on the rôle of those individuals who held significance in the patient's previous history. The physician becomes associated in the patient's psyche with those memory-images because he makes him divulge all his most intimate material. He becomes burdened by these images.[11]

With Freud, the physician is a passive object of transfer. The patient is grasping for something on which to hold. It is necessary that his affections should find some place of rest and the physician becomes the passive object of affection. But, according to Jung, the physician must do more than merely be an object of fixation. He must actively lead the patient on to a solution of his difficulties. Freud is more mechanical. Analyze, uncover complexes, present an object of transfer and let the inner drives of the patient work out their own solution. But, according to Jung, the physician must not only analyze, he must also synthesize.

"The psychological treatment must not only destroy an old, morbid attitude, it must also build up a new, sound attitude. But for this a reversal of vision is needed. Not only shall the patient see from what beginnings his neurosis arose, he shall also be able to see towards what justifiable aims his psychological tendencies are striving. One cannot, as though it were a foreign

[11] *Loc. cit.*, p. 20.

body, simply extract the morbid element, lest one remove with it an essential piece which, after all, is destined to be lived with. This piece must not be weeded out, but must be transformed till it attains that form which can be included in a way that is meaningful to the whole of the human psyche.''[12]

The physician must be careful to work out a synthesis, that is, in *accordance with the individuality of his patient.* His own syntheses and sublimations are not to be imposed upon others. Where and how is he to find the ideal goal that is in harmony with the specific character of his patient? Jung's theory of the dream leads him on to the solution of this problem, and here again he differs fundamentally from his master. With Freud, the dream is merely a safety valve for suppressed desires. It looks to the past and not to the future; but with Jung, and also Maeder, the dream is a constructive synthesis. It reveals the end at which the patient unconsciously aims. Its interpretation, therefore, will give the ideal solution capable of fully satisfying the hidden forces in the personality of the dreamer. Therefore, dream analysis is important, according to Jung, not only in analysis, but also in synthesis.

Freud criticises Jung's attempts to lead the patient on to sublimation as unscientific, and maintains that they reduce psychotherapy to the level of pastoral advice. He quotes the complaints of one of Jung's patients who came to him after being unsuccessfully treated by his refractory disciple. ''Instead of freeing me analytically, each session made new and tremendous demands on me, on the fulfilment of which the overcoming of the neurosis was supposed to depend. Some of these demands were: Inner concentration by means of introversion, religious meditation, living together with my wife in loving devotion, etc. It was almost beyond my power, since it really amounted to a radical transformation of the whole spiritual man. I left the analysis as a poor sinner with the strongest feelings of contrition and the very best resolutions, but at the same time, with the deepest discouragement. All that this physician recom-

[12] *Loc. cit.*, p. 22.

mended, any pastor would have advised, but where was I to get the strength?"[13]

Freud's criticism, however, is perhaps unjust. Patients are often unable to work out a solution for themselves. A full understanding of the difficulties does not work the miracle of a cure. It is only when they find a satisfactory solution to the problems that confront them and an outlet for the driving forces of human nature, that is fully satisfactory, that the baneful efforts of their mental malady commence to dwindle. Whatever may be said in criticism of Jung, his work is to be looked upon as a distinct advance upon that of his master.

CRITIQUE OF JUNG

Jung's therapy is an essential improvement on that of Freud. If Freud had only been content with having developed the analytic side of psychotherapy and then recognized the contributions of his disciples, he would have found much of value in the work of Jung. But there runs throughout his writings an evident tendency to set himself up as the peerless master whose dictum must be accepted not only as true but also as complete. His writings indicate, particularly his *History of the Psychoanalytic Movement*, that he has a conviction that he has discovered everything of value in psychotherapy, and there can be nothing added to his doctrine. Others have simply to live in his shadow and practise his principles, but they can add nothing new.

Freud gave us the essentials of the analytic technique. Jung attempted to insist upon the necessity of helping the patient in his efforts at sublimation. Though he has not given us as adequate a technique for synthesis as Freud has given us for analysis, he has recognized the fact of the necessity of this synthesis. His philosophical concepts are not as valuable as his therapeutic outlook.

Jung's Concept of the Libido.—Can the libido be conceived of as a unit force? Yes, if the unit force is confined to the organism, and if it is conceived of as the psyche or the entelechy

[13] *History of the Psychoanalytic Movement*, p. 55.

or individual soul, that can seek happiness in many ways, and has many powers and faculties to be satisfied; but this concept supposes a metaphysical substance and is something very different from energy and its transformations.

Can the libido be conceived of as a world-soul? Jung himself recoiled from the full meaning of this concept in his article, "La Structure de l'Inconscient," when he contemplated the individuality of the body. There are multiple organisms in the world, and how can they be conceived of as constituting any real unity? Society, after all, has no existence apart from the individuals that compose it. Public opinion has no reality except in the minds of individuals. It is, however, not quite clear that Jung conceives of the collective psyche as a being apart, although in my exposition I have given this concept as the only logical one to be deduced from his writings. He never speaks of the collective psyche as an entity, but always as a function. Can it be that in some way society functions as a psyche, and transmits from generation to generation the concepts of individuals, not by social processes, such as books and conversation, but by something wholly apart from the concrete realities of the environment? This seems to be Freud's concept of the mass psyche. Goldenweiser subjects it to the following criticism, which will hold also if Jung conceives of the psyche as an hereditary principle in the life of the race.

"Freud does not utilize tradition, 'social inheritance,' as the link between the generations. What link then does he assume? That of a racial unconscious, propagated by inheritance from generation to generation, and enriched on its way by the psychological and cultural experiences of its temporary human carriers. In this mechanism, which is but a revival of the theory of the inheritance of acquired characters, lies the dynamic principle of the racial unconscious, and with it stands or falls most of what psychoanalysts have contributed to the interpretation of social science.

"But modern biology turns a deaf ear to the claims of use inheritance. In the light of what the biologist knows, and does not know, this alleged process is nought but 'inheritance by

magic' to use Kroeber's phrase. For all we know or can convincingly assume, the generation receives nothing from its precursor beyond the general psychophysical inheritance of the race, plus the accumulated civilizational possessions acquired through education and the other channels of cultural transfer.''

Jung's Concept of Ontogeny and Phylogeny in Relation to Mental Disorders.—The basis for the comparison between ontogeny and phylogeny is found in embryology. Thus, for instance, the original stage of the brain is that of a vesicle with three compartments. A brain of this kind is found in certain lower organisms. The brain then undergoes a course of development in which, at various stages, it resembles more or less roughly the form of the cerebrum in animals at different levels of organization. Again, every human being has at one period of his embryonic development, the gill slits characteristic of fish, and the branching of arteries in the neck required by the gill slits in fishes. Again, the kidney undergoes not a continuous development, but a discrete one in which first one and then another secretory apparatus is developed and discarded until one comes to the final form of the human kidney.

On these facts one of the common arguments for evolution is based. If a human being goes through a series of stages characteristic of lower organisms, he must, in the history of the world, have ascended through all of these stages. It is a very suggestive fact, but by no means a conclusive argument. The law of recapitulation is one explanation, but it is not the only conceivable one. The embryological argument is one of the weaker ones for the theory of evolution. The argument affords a still more slender support when one draws from it the further conclusion that the mind of man in its ontogenetic development must also recapitulate the mental development of the race. There are no facts in the mental development of the child that correspond to the well-tested facts of embryology, and, furthermore, very little is known of the evolution of the race. Freud supposes that the most primitive race is that of the Australians with their highly developed totemism and

peculiar forms of symbolic thinking, but, as a matter of fact, it is very likely that Wundt is right when he and many anthropologists point out such people as the Pygmies, the Tasmanians, the Andaman Islanders, the Vedas, the Negritos, as more primitive. When we study these primitive peoples, we are very much surprised to find that we get further and further away from the realization of the evolutionary concept of the primitive horde. For primitive man is very much like ourselves. He is a monogamist and a monotheist and has principles of morality, and complexity of language that make it very hard for us to see how he is related to a primitive horde of beasts. Jung, however, maintains that the concepts of phylogeny and ontogeny lead us back to a stage in which man was very different from ourselves. His very type of thought was different. It was not logical, but symbolic thought. The archaic type of thinking was similar to the flow of thought in dream-life.

"All this experience suggests to us that we draw a parallel between the phantastical, mythological thinking of antiquity and the similar thinking of children; between the lower human races and dreams. This train of thought is not strange to us, but quite familiar, through our knowledge of comparative anatomy and the history of development, which show us how the structure and function of the human body are the results of a series of embryonic changes which correspond to similar changes in the history of the race. Therefore, the supposition is justified that ontogenesis corresponds in psychology to phylogenesis. Consequently, it would be true, as well, that the state of infantile thinking in the child's psychic life, as well as in dreams, is nothing but a reëcho of the prehistoric and ancient."[14]

Is it true that symbolic thought phylogenetically antedated logical thought? This cannot conceivably be the case, and nothing in the history of primitive people demands that it should be. Both types of thought are as old as the race. If primitive man thought in symbolic terms, we do also in our poetry at the present day, and if we argue and dispute in logical terms, primitive man did also by insight into ends and adopting means by

[14] Jung, *Psychology of the Unconscious*, p. 14.

which they were to be attained. The relics that we have of his tools, his instruments of war and of the chase show us that as far back as men sought food in order to live, so far may be traced our logical manner of thinking. True, it is that his archaic thought was often mixed with the symbols of superstition. Thus, for instance, when he placed a feather on the end of his arrow, the original reason may have been to lend magic speed to its flight, and he had no insight into the mechanical value of the feather in stabilizing the flight of the arrow. But his conclusion in this matter and similar conclusions were perhaps perfectly logical when we consider the principles that constituted the premises of primitive man. He differed from us not so much in his mode of thought as in his principles.

Concept of the Psychosis as a Regression.—Can we now look upon the psychosis as a regression to the stage of primitive man? When we consider how slender the evidence on which the theory of recapitulation is based we cannot place any great faith in its ability to guide us through the maze of the psychoses. The stages of development of the race are not clear. To be perfectly honest, we must say that we know very little about them. The data on which psychoanalytic interpretations are based are often faulty. Goldenweiser has pointed this out, and no anthropologist would rely upon many of the facts Jung and Freud have taken as the basis of their psychology. If we do not know the stages of the development of the human race, it will not help us in our psychotherapy to maintain that the psychosis is a regression to the unknown stages, and it is by no means clear that it is.

CHAPTER III

ADLER

Alfred Adler and the Neurotic Constitution.—Adler is another of the students of Freud who broke away from the principles of the master in order that he might work out an independent system. The theory he developed is very ingenious, and applies in its general outline to a certain number of cases. It introduces us to very interesting mechanisms and is, therefore, important.

According to Adler, many of the diseases of the organism are due to the existence of inferior organs. These organs become infected because they are hereditarily deficient in vitality. It seems at first sight that it is a matter of pure chance why an organ becomes infected or is wounded by a blow from without. But, according to Adler, the reason is to be sought in the inferiority of the organ and not in the vagaries of chance.

He points out, for example, that a boy sustained an injury to his left eyeball from the pen of a school companion in August, 1905. In October, 1905, the same left eye was injured by a splinter, and in January, 1906, the same eye was again injured by a pen prick. The maternal grandfather of the boy had an iritis of diabetic origin. His mother and a younger brother both had convergent strabismus, hypermetropia, and amblyopia. His mother's brother had convergent strabismus, and often a conjunctival eczema. The patient had full acuteness of vision, slight hypermetropia, and lack of conjunctival reflex in both eyes. Adler regards the boy's defects as due to hereditary organ-inferiority. The whole optical apparatus was inferior and could not protect itself against injury from without. It was inferior, too, because of heredity.

He cites many such cases to bring out his point, and maintains that the inferiority of an organ may reveal itself in the descendants in the most diverse parts of the organ. Thus, for

instance, in the ascendants, the respiratory system may be inferior and manifest the inferiority in the nasal passages, but in the descendants, the inferiority may be manifested in the lungs.

There can be no organ-inferiority without accompanying inferiority of the sex apparatus, for the organ-inferiority is inherited through the sex cells, which must, therefore, be imperfect. Not only this, but "every organ-inferiority carries its heredity through and makes itself felt by reason of an accompanying inferiority in the sexual apparatus."[1]

Given an inferior organ, it must compensate for its inferior structure by increased activity. The classical example of this is hypertrophy of the heart in valvular disease. The compensation does not stop at mere adequacy, but transcends the limits of bare sufficiency. Over-compensation and not merely compensation is always the result of organ-inferiority.

The nervous system plays the main part in this over-compensation. This takes place in two ways:

(a) By organic reflexes. The heart, for example, cannot help but hypertrophy if a valve leaks. Reflexes from the vascular system bring on an overactivity of the heart muscle which leads, as in all muscles, to hypertrophy.

(b) Not only organic but psychic factors are involved. At first, there is a particular interest manifested in protecting the inferior organ and later on a peculiar drive to show the excellence of the organ by making it work harder than necessary, and taking delight in the satisfaction derived from the resultant triumph.

Organ-inferiority is not merely a physical matter. The physical condition leads to an ensemble of phenomena that are reflected on the psyche in such a manner that the resultant superstructure has a peculiar characteristic impression that gives the basis for, and coloring to, the mental disorder that may be derived from the original organ-inferiority.

[1] Alfred Adler, *A Study of Organ-inferiority in its Physical Compensations.* "Nervous and Mental Disease Monograph," Series No. 24, New York, 1917, p. 53. Cf. also his work, *The Neurotic Constitution,* New York, 1917, pp. xxiii + 456.

Adler goes so far as to suggest that the foundation of all ability is in disability. Genius, he looks upon as an over-compensation in an inferior brain. Demosthenes became a great orator because he over-compensated his stuttering. Mozart had defective ears, Beethoven, otosclerosis; Bruckner's ears were stigmatized by a nevus. Organ-inferiority makes for special ability because it is a source of a feeling of inferiority which spurs one to get rid of it by the will to power, or what Adler terms the "masculine protest": "I must act as though I were a complete man." Thus, the feeling of inferiority is identified with effeminacy. The compensating pressure from the psychic superstructure impels the patient to make sure that he is going to play a manly rôle. The meaning of the resultant neurosis, therefore, assumes the form of the antithetical but fundamental thought: "I am a woman, and will be a man."

All of this leads to the formulation of the plan of life. The patient is a weakling. He, therefore, compensates for the consciousness of his defects by a fiction that elevates his personal estimation. The fiction has no real foundation. The feeling of superiority which it produces is not based on actual accomplishment. It is the will to seem, and the neurotic lives under the hypnotic influence of an imaginary plan of life or guiding fiction which cannot be told to others. Manifestation of it would lead to ridicule. It is, therefore, suppressed and becomes unconscious.

The guiding fiction does not remain the only plan of life. It cannot be lived out, and a plan must be developed that can be. There is, therefore, produced an "antifiction" which assumes the rôle of the guide of outward conduct.

"In the contrary fiction, there are active experiences, and education, social and cultural formulas, and the traditions of society. In times of good humor, of security, of normal conditions, of peace, this is the prevailing form, which causes a restraint of the combative predisposition and effects an adaptation of the traits of character to the environment. Should the insecurity increase and the consciousness of inferiority emerge, then the contrary-fiction is deprived of value because of an

increasing abstraction from reality, the dexterities become mobilized, the nervous dogmatic character asserts itself and with it the exaggerated sense of ego-ideal. It is one of the triumphs of human wit to put through the guiding fiction by adapting it to the antifiction, to shine through modesty, to conquer by humility and submissiveness, to humiliate others by one's virtues, to attack others by one's own suffering, to strive to attain the goal of manly force by effeminate means, to make oneself small in order to appear great. Of such sort, however, are the expedients of neurotics."[2]

If the antifiction is forced completely into the background, and the individual gives himself up wholly to the vagaries of the fiction with its bizarre withdrawal from reality, we have the abnormal behavior of a mental breakdown.

Critical Estimate of Adler's Theory.—It is evident that the basis of Adler's view of mental disorders is his discussion of the existence of inferior organs. But his whole treatment of the existence of such organs and their heredity offends against the sound criteria of empirical science. The various claims in the study of organ-inferiority should have been made the object of careful statistical investigation. Terms should have been clarified, and attempts made to compare the theory with the facts. But there is not the slightest sign of any endeavor to work out correlation as Karl Pearson has done, or to establish conformity of offspring to the probable expectation of Mendel's laws.

As we said in discussing above[3] the plan of life, Adler merely cites in proof of his theory a few incidents of the association of genius with some kind of specific inferiority that corresponds to the special type of ability, but if Adler's theory were sound, all musicians, for example, should have some kind of inferior ears, or at least aural defects should be more common in the musical than in the non-musical. This could easily be determined if it were so, but in all probability it is not.

[2] *Loc. cit.*, pp. 81, 82.

[3] Cf. *supra*, p. 177 ff.

But leaving aside the substructure of Adler's theory, and it may really be disregarded as wholly superfluous, we may ask whether an inferior organ ever leads to a feeling of inferiority, and is such a feeling ever a source of abnormal behavior. Both questions are to be answered in the affirmative, as many cases prove.[4] Adler has found, not the universal, but only an occasional factor in the etiology of abnormal reactions. He has also pointed out the great value of the plan of life in directing the conduct of the individual.[5] He has not only done this, but has also taught us to look for a double plan of life, and has made us realize, in some cases at least, that psychoneurosis is the resultant of a conflict between two plans of life, one conscious, and the other unconscious. This is probably only a new formulation of the old doctrine of the two selves, and a poetic recognition of the fact that we have two groups of emotions with which are associated two sets of impulses, desires, and ideals.

[4] Cf. the case cited above, p. 246.

[5] For an insight into the influence of the plan of life on the production of a poetic genius see *Percy Bysshe Shelley, an Introduction to the Study of Character*, by T. V. Moore. Psychological Studies from the Catholic University of America. *Phychological Monographs*, Vol. XXXI, No. 2.

CHAPTER IV

THE PSYCHOPATHOLOGY AND PSYCHOTHERAPY OF ADOLF MEYER

We now turn to the study of a psychiatrist whom Freud would not look upon as a psychoanalyst in the narrow sense of the term used in his *History of the Psychoanalytic Movement.* In fact, that work seems to have been written to prove that only strict Freudians have a right to claim that they are practising psychoanalysis.

Psychoanalysis may, however, be taken in the much wider sense of any scientific attempt to discover the mental roots of a patient's disordered condition. In that sense, Adolf Meyer is a psychoanalyst, and the science owes much to his researches.

His writings are characterized by a sane moderation, and are full of valuable therapeutic suggestions. A review of his work is, therefore, of value not only theoretically, but for the practical purposes of mental treatment.

Types of Constitution.—The insistence upon an understanding of the individual as a living personality is the dominant note in Professor Meyer's psychiatrical work. To understand the personality we must be able to distinguish various types of individuals.

It has too often happened that instead of studying individuals the student of psychiatry has given attention to the *diseases* of the mind. He rests content when a diagnosis can be made and the patient may be classified in some schema of disease entities. His eye is open for symptoms. He attempts to make the case fit previous standards and fails to notice important factors in the development of the disorder. Thus, he classifies but does not explain. He gives a name to his patient's condition and ties his hands so that therapy is impossible.

Professor Meyer takes a different point of view. He even calls in question the concepts of disease entities in psychiatry,

and maintains that we have only types of individuals reacting to their environment in certain characteristic ways.[1]

The matter of prime importance for the psychiatrist, therefore, is to understand these types of individuals and their characteristic ways of reacting to the difficulties of life. The pathological types of constitution may be named and classified very much in the same way as psychiatry has treated its disease entities. This analysis of the pathological character Meyer has given us in a study entitled "An Attempt at Analysis of the Neurotic Constitution."[2] In this article he distinguishes the following types:

1. The Psychasthenic Type. In the sense of Janet, *i.e.*, the individual with manias, phobias, scruples, etc.

2. The Neurasthenic Type. The individual who is quickly fatigued and easily irritated.

3. Hypochondriasis, usually built on a feeling of ill-health which leads to self-observation and explanation.

4. The Hysterical Constitution. The emotional individual who simulates illness, or exaggerates real difficulties; who craves attention and contrives to bring his sickness into prominence in the presence of others.

Of hysteria, Professor Meyer writes, "I am inclined to refer to hysteria all the mental and physical disorders which are produced by the effects of an emotion or idea which may work unconsciously to the patient, so that the simulation claimed by others is usually beyond the control of the patient, and the whole explanation is but accessible on hypnosis."[3]

5. The Epileptic Constitution manifesting periods of excessive irritability between the characteristic attacks.

6. "Certain Types."

   (a) The unresistive—responding easily to fever, to intoxication.

   (b) The maniacal-depressive.

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[1] Cf. his article "Constructive Formulation of Schizophrenia." *The American Journal of Psychiatry*, 1922, I, pp. 355-364.

[2] *American Journal of Psychology*, 1903, xlv, p. 96.

[3] *L. c.*, p. 101.

(c) The paranoic—the suspicious individual with a tendency to self-isolation and to read a deep meaning into the most ordinary events.

(d) The deterioration type (dementia præcox). The easy-going individual who avoids conflicts, who suffers injury, and who is meek and humble—simply because he has not the energy and initiative to protest. He is likely to moralize, delineate standards that he cannot attain till ideals are all but achievement. The final state of such an individual is one of marked deterioration.

Under these headings are contained the chief types of individuals that come to the psychiatrist for treatment. The schema must be looked upon as a classification of individuals and not of disease entities. This distinction is one of fundamental importance. By making it, Meyer would direct the student's attention to the individual and make him realize that his disorder arises from his springs of action, and only in relation to them can it be understood. The schema is really the first step in a study of the psychopathic character. It indicates in a few headings the various types of individuals that the psychiatrist is called upon to treat. It would be a mistake, however, to look upon the schema merely as a mold for classifying individuals. Meyer is no more content with classifying individuals than he would be with naming diseases. The schema is only a first means of orientation in a very complex study of a human personality, and the balancing factors which are involved in his adjustment to his environment.

Disease Entities.—The psychopathic individual reacts to his environment in a more or less characteristic way. His type of reaction is determined by his neurotic constitution. Not everyone can become a neurasthenic or a psychasthenic or hysterical or run the downward course characteristic of dementia præcox. In this way mental troubles, in some of their forms at least, differ from the disease entities of general medicine. For, given an infection with an adequate number of sufficiently virile

typhoid bacilli, any man would contract typhoid, and manifest the definite symptoms of the disease.

The case with mental disorders is somewhat different. The full reason why an individual develops hysteria is not to be sought, *e.g.*, in some disorder of the pelvic organs. Such a disorder may be a factor and is a factor only when it works upon a neurotic constitution of the hysterical type.

Given an individual whose sickness commenced with a period of headache and malaise, who has an enlarged spleen, a painful abdomen, rose spots on his skin, a daily rising temperature, a positive Widal, and from whose blood the Ebert and Koch bacillus may be cultivated, we could make a diagnosis of typhoid. It would not be necessary for us to study his constitution and the various influences which affected it from birth to the onset of the present illness. The symptoms alone would give the diagnosis, and the diagnosis would indicate the treatment and special steps to be taken in the event of certain well-known complications.

But with a mental disorder the problem is different. Even granted that certain classical symptoms are present and that the case can be classified according to one system or another—that does not settle the problem by any means. The concept of disease entities cannot be taken from general medicine and applied without any modification to mental disorders.

"The maintenance of the disease-concept has a great advantage for orderly thinking, but like the neovitalistic modes of presentation of biological facts, it would be more detrimental if it should be considered as more than a *formula* of available facts, or a starting point of more fundamental work."[4]

The detection of classical symptoms, while all-important in general medicine, is only suggestive in psychiatry. They indicate what line of questioning will throw the most light upon a thorough understanding of the case—an understanding which involves:

[4] "The Problems of Mental Reaction Types, Mental Causes and Diseases," *The Psychological Bulletin*, 1908, V, p. 259.

1. An intimate study of the living personality who is before us. This study will be directed and aided by one's experience with the neurotic types of constitution.

2. A study of the difficulties or conflicts under which this individual has labored.

3. The type of reaction that he has manifested in dealing with his difficulties.

Such a study does not necessarily give us what general medicine aims at—the picture of a disease—but insight into an individual. What troubles him is not always toxins, but a neuropathic constitution and his friction with reality.

It is not to be supposed that Porfessor Meyer underrates or neglects the effects of known or unknown toxins on a patient's mental condition. "Let us consider . . . the condition of structure of the nervous system, and especially of the cerebrum, and of the sensory-motor equipment, and of the vegetative and regulative mechanisms of the body, *i.e.*, the internal secretion organs, the foci of infections, etc. Whatever facts we can get in this *structural* level of observation are undoubtedly most dependable, controllable, and lasting. Sometimes, they *are a complete explanation.*"[5]

He gives all due consideration to toxic conditions, but directs attention to the fact that in referring symptoms to unknown toxins and imaginary lesions, one may neglect patent psychogenic factors directly responsible for the present condition.

"As we study anomalies of mental activity and conduct, we find some plainly due to extra-psychological events, for instance, happenings in the brain, such as vascular occlusions with consequent softenings or inflammatory processes, or simple senile atrophy, or intoxications; that is, conditions which in their etiology, evolution and outcome, are clinched in terms of physiology and pathology of the nutrition and vascular apparatus of the brain. There are, however, other disorders in which the circulatory and nutritional facts are merely incidental, and which we find best expressed in terms of mental events or reac-

[5] "Aims and Meaning of Psychiatric Diagnosis," *The American Journal of Insanity*, 1917, lxxiv, p. 164.

tions and their consequences. As such I should mention the results of emotional shocks or emotional fretting, or of continued uncorrected and unchecked false reasoning. Since in these conditions, certain infra-psychic biological relations are frequently found to be at fault as well, through incidental loss of sleep and malnutrition, etc., the physician is inclined to overrate them in his psychophobia, and, finally, to *assume* these subcentral conditions as the noumenal or 'real cause,' even when he does not *find* them or has nothing whatever to work on.''[6]

An undogmatic attitude is necessary to the physician. It is easy to say all mental disorders mean some kind of brain disorder, whether I can find the lesion or not. ''To try to explain an hysterical fit, or a delusion system out of hypothetical cell alterations which we cannot reach or prove, is at the present stage of histo-physiology, a gratuitous performance. To realize that such a reaction is a faulty response or substitution to an insufficient, or protective, or evasive, or mutilated attempt at adjustment, opens ways of inquiry in the direction of modifiable determining factors, and all of a sudden we find ourselves in a live field, in harmony with our instincts of action, of prevention, of modification and of understanding, doing justice to a desire for directness instead of neurologizing tautology.''[7]

A study of the reaction of the individual to the situation is complementary to the analysis of his character.

The psychiatrist, therefore, must study not only types of individuals, but their characteristic reactions. The reaction of the individual, or, if you will, his behavior in any situation, must be traced to its source, whether organic or mental.

To understand abnormal conduct is the first step in modifying and correcting behavior or in discovering the fact that the condition cannot be cured.

Abnormal Reaction Types.—Professor Meyer distinguishes the following types of reaction:[8]

[6] "The Problems of Mental Reaction Types, Mental Causes and Diseases," *The Psychological Bulletin*, 1908, V, p. 253.

[7] *L. c.*, p. 255.

[8] For a fuller statement Cf. *l. c.*, p. 255 ff.

1. The reaction of organic disorders:
   (a) Symptom pictures of asymbolia, apraxia, and aphasia.
   (b) Reactions on ground of focal or diffuse affections such as epilepsy, Korsakoff's complex, general paralysis, senile dementia.
2. Delirious states with dream-like imaginative experiences:
   (a) Exogenous (toxic-exhaustive), *e.g.*, direct intoxication (hasheesh, belladonna) or fever, or exhaustion.
   (b) Endogenous or psychogenic hysterical or other psychogenic tantrums.
3. The essentially affective reactions. Manic-depressive states.
4. Paranoic developments in various grades of development.
   (a) Tendency to uneasiness, brooding sensitiveness.
   (b) Appearance of dominant notions, suspicious, or ill-balanced aims.
   (c) False interpretations with self-reference, and tendency to systematization.
   (d) Retrospective or hallucinatory falsifications, etc.
   (e) Megalomanic developments, or deterioration.
   (f) At any period antisocial and dangerous reactions may develop.
5. Substitutive disorders of the type of hysteria and psychasthenia.
6. Types of defect and deterioration: Existence or development of fundamental discrepancies between thought and reaction, etc.

As Meyer remarks: "These conditions are not to be taken as 'diagnoses' but as reaction types." It would almost seem as if he would do away with the concept of disease entities and replace it by that of reaction types. "What constitutes a disease unit," he says "is either merely a reaction type, or it is a reaction type under special etiology and special evolution and outcome, or it is possible to single out a definite item of events (infection or intoxication, or even a simple, rough injury or lesion). But, in these days in which the experimental interpre-

tation has become so much superior to the old-fashioned way of telescoping events into the concept of a 'lesion,' we cannot afford any longer to ignore the claims of conduct and behavior or mental reactions, as they may give the safest and most sufficient presentation of the facts in a disorder.''[9]

In an article on the ''Fundamental Conceptions of Dementia Præcox,''[10] Meyer gives another classification, or perhaps what should be termed an explanatory analysis of reaction types. It is based upon the fact that ''every individual is capable of reacting to a very great variety of situations by a limited number of reaction types.''

Roughly speaking, the reaction types may be divided into the normal and abnormal. The normal reaction type—or to use the common man's English, the normal way of getting out of a difficulty—is to look matters squarely in the face, find out the best thing to do and go ahead and do it. ''The full, wholesome, and complete reaction in any emergency or problem of activity is the final adjustment, complete or incomplete, but at any rate clearly planned so as to give a feeling of satisfaction and completion.''[11]

The abnormal way is to evade the issue, to hide one's head like the ostrich, and think the danger is past when not seen; to persuade oneself that sorrows are healed when they are suppressed. There are various ways of doing this, such as:

1. An act of perplexity or evasive substitution.

2. Temporizing attempts to tide over the difficulty, based on the hope that new interests will crowd out what would be fruitless worry or disappointment.

3. Fault-finding with others, imaginative thoughts, praying.

4. A tantrum, an hysterical fit.

5. Negativism, an uncontrollable, unreasonable blocking factor—the type of reaction characteristic of dementia præcox.

Therapy of Mental Disorders.—The study of reaction types and their setting initiates us into the mysteries of the patient's

[9] *L. c.*, p. 259.

[10] *British Medical Journal*, September 26, 1906.

[11] *L. c.*, Reprint, p. 3.

life. We get an insight into the etiology of his trouble and can commence a rational therapy. This therapy consists of discovering the conflict in the patient's life from which his type of reaction proceeds. That this conflict may not lie on the surface of things is evident from the very character of the abnormal reaction types, from their tendency to evasion and suppression. In the discovery of the conflict, Meyer welcomes all the methods of modern psychoanalytical technique. It makes no difference how the conflict is discovered, whether by simple conversation with the patient or the analysis of free associations, or the word association test, or the interpretation of dreams. The all-important problem is to get at the difficulty of adjustment, and find out the cause of the trouble. The next thing to be done is to remove any existing cause of disturbance wherever possible, or to inactivate it by explanation, and a reëducation of the patient. At the same time, we must find out the patient's level—that is, find out what he can do. "At every step, every person can do something well and take a satisfaction in doing it."[12]

This step in the treatment is one of fundamental importance. Many abnormalities arise because the patients have involved themselves in the intricacies of a self-spun web of imaginations. They have thus separated themselves from the real world, and the normal relations of social existence become more and more impossible. To tear through this artificial envelopment and teach them that the "satisfaction in something *done* is to be valued as ten times greater than the satisfaction taken in mere thought or imagination, however lofty,"[13] is the goal of modern psychotherapy.

The patient has to find a solid foundation for constructive progress. Once this is successfully accomplished, there is no danger of further complication. The individual finds his level and leads a useful and even happy existence.

Just as we must recognize consumption before an individual

[12] "What do Histories of Cases of Insanity Teach us Concerning Preventive Mental Hygiene during the Years of School Life?" *The Psychological Clinic*, 1908, II, p. 98.

[13] *L. c.*, p. 98.

has wasted away and therapy is too late, so also we must recognize mental disorders in their earliest beginnings. "As long as consumption was the leading concept of the dreaded condition of tuberculosis, its recognition very often came too late to make therapeutics tell. If dementia is the leading concept of a disorder, its recognition is the declaration of bankruptcy."[14]

Dementia is always preluded by abnormalities of reaction. Experience teaches us that evasions, suppressions, tantrums, etc., are abnormal reactions. They spell the beginnings of a downward course, which if not corrected may lead to complete deterioration. In dementia præcox, for instance, "we have to do with a perfectly natural, though perhaps unusually persistent development of tendencies difficult to balance."[15]

The characteristic traits of the præcox patient, his isolation from the real world, his negativism, his fantastic, imaginary existence, his superficial moralizing, are all tendencies which we meet in normal children, and in adolescents. In most children these tendencies are balanced by interests in the real world which are always counteracting their inclination to day-dreaming. Suppose, however, there comes a crisis of some kind, a failure, following upon bright expectations, associated with the inability to escape from the harsh demands of an unsympathetic environment. Then what was before incipient and curable, rapidly develops into a state of mental deterioration from which there is no hope of recovery. We must, therefore, learn by a study of reaction types and their evolution to recognize danger when it first appears, and take the proper steps before it is too late. What are these steps?

1. Take the individual away from the conflict.
2. Find his mental level.
3. Engage him in work suitable to his real abilities.

For at every step every person can do something well and take satisfaction in doing it.

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[14] "Fundamental Conceptions of Dementia Præcox," *British Medical Journal*, September 29, 1906. (Reprint.)

[15] "What do Histories of Cases of Insanity Teach us Concerning Preventive Medical Hygiene?" *The Psychological Clinic*, 1908, II, p. 96.

CHAPTER V

THE TECHNIQUE OF PSYCHOTHERAPY

Psychotherapy must not be conceived of as a method of treating diseases of all kinds. This has been a claim that charlatans of all sorts have made. "Mental healing" is not meant to be a substitute for other forms of therapy. It deals only with a certain group of cases, and in that it is like all sound therapeutic procedure which is, by nature, specific and not general. A panacea for all human ills has not yet been discovered. Psychotherapy has to do with mental disorders. If it is applied to patients with physical disabilities of organic origin it can have no direct therapeutic value. It may aid by a general improvement of the mental attitude, but beyond that, in truly physical disabilities, it can do nothing. But not all physical symptoms are due to organic causes. A paralysis, *e.g.*, is a physical symptom. Blindness, deafness, convulsive seizures, all manifest themselves as physical symptoms. They are not, however, by that fact always to be attributed to organic cause. If physical symptoms, therefore, are presented in a psychiatric clinic for treatment, the first question to be asked is whether or not the symptoms have merely an organic or a mental basis. If organic, they are to be referred to a purely medical practitioner or a surgeon. If not organic, they are functional; and if functional, they are amenable to psychotherapy. In most organic disorders there is a functional overflow, that is to say, the apparent disability has two components, one organic, the other functional. Sometimes the organic disability is trifling, the functional is the main disabling mechanism. Such cases can be so much improved by psychotherapy that they seem to be cured.

A. TREATMENT OF FUNCTIONAL PHYSICAL DISORDERS

Functional physical disorders are very often monosymptomatic, that is, the presenting symptom is practically the only one. It is true that they are always based upon a defect of personality, but at the moment this defect manifests itself in one way which

may be promptly and readily cured. What now is the technique of cure in these more or less monosymptomatic conditions? An understanding of the technique of the cure can best be explained by a few cases drawn from the treatment of the war neuroses. Take for example the treatment of tremors.

Cases of functional tremor were brought into the neurological hospitals in France after an engagement just like the wounded into the surgical hospitals. We were told that such cases had to be cured before sending them to the ward, and it was often easy to carry out the orders. What was the method? The method depended upon the principle that a relaxed muscle cannot tremble. The medical officer of the day came to the soldier whose right arm, let us say, was executing gross, and apparently uncontrollable tremors. He started by giving his patient a simple lesson in muscular contraction. He pointed to his biceps and said: "When I bend my arm, this muscle must contract. When I extend it, the muscle on the other side must contract while the former muscle relaxes. If both muscles contract at the same time, the result must necessarily be a tremor. But if a tremor develops and the muscles on both sides are then relaxed, the tremor must disappear."

A second point was now made use of. Passive movement of a member, that is, movement executed by another, relaxes the muscles. The physician then takes the arm of the patient, bends and stretches it, and moves it about, and shakes it until all tension is gone. He then shows the patient the relaxed arm without a tremor. It was interesting to watch the face of the soldier when his tremor disappeared. Cures of tremors brought about in this way at the front were not temporary, but permanent. We have already explained the psychological reason for the war neuroses,[1] and will not go into the matter again. The technique in the case of arm and leg tremors was universally successful.

Let us now take, as an example, the cure of functional deafness. The technique involved in the first place an explanation of the probable nature of hysteria. The word hysteria was not mentioned. The patient was told that there were two types of

[1] Cf. *supra*, p. 203 ff., 229.

interruption possible between the ear and the brain. I used to employ the simile of a telephone exchange. If there is a storm and the wires are broken down, nothing can go through the exchange until the wires are strung again. This corresponds to an organic injury. If central should go to sleep at her desk, there would be no physical interruption of the wires; the central station, however, would not answer. Connections could be quickly established by awakening central.

After the elimination of the possibility of real organic injury, the patient would be told that in his case, the neural connections were not really broken, but a brain centre was asleep and its proper functioning could quickly be reëstablished. This figurative explanation is probably as good as any that could be given in the present state of our information on the phenomena of hysteria. After this, the suggestion was reinforced by an electric battery. The treatment was painful, and perhaps made it worthwhile to hear. At all events, I have repeatedly seen cases of psychological deafness cleared up in a few minutes by this treatment. Functional paralysis may be cured in a similar way.

One functionally paralyzed, for example, so that he cannot walk, will do things involving the activity of all the necessary muscles, but will not walk, or will perhaps walk slowly only with assistance. Such patients will insist that they need a support, and will actually pick up the chair on which they lean and move it ahead of them in an effort that requires more expenditure of energy than walking itself. It is not the place to point out here the differences in the reflexes which distinguish organic paralysis from functional. This differentiation is usually easy. When one has assured himself that the paralysis is functional, he commences the cure by merely persuading the patient to stand, and then urges him to take a step with assistance. He then points out that the assistance is unnecessary. Mere urging and insisting brings about the cure.

One of the most interesting fields for the display of suggestive treatment is aphonia, that is, the inability of making a voiced sound. These patients are really cured by imposing upon their ignorance. At least, the first step in the cure is a trick. Most people do not know that coughing involves the activity of the

vocal cords. A voiced sound can always be detected in the cough of an individual whose vocal cords are not paralyzed. If they are paralyzed in reality, the attempt to cough leads to a blowing sound, but to no voiced tone. The hysterically aphonic patient is, therefore, asked to cough. If the physician hears a tone of any kind however slight, he points this out to the patient. He asks him to cough again, and make the sound, assuring him that he is making progress. He tells him that the sound indicates that his vocal cords are acting, and then persuades him to cough "O." This having succeeded, he persuades him to cough "E," and so goes through the vowel sounds. After that, it is an easy matter to put on the consonants. The patient is then told that he has made every sound in the English language, and that there is no reason in the wide world why he cannot talk, and the physician insists on his pronouncing a word. The cure is ordinarily ended within fifteen or twenty minutes. Some patients apparently get the idea that the treatment is to extend over several sittings. They must be promptly disabused of any such notion and told that they are going to talk before they leave the room. I have never had this technique of treatment fail of its result.

The cure may be accelerated by the use of an electric battery. You tell the patient that you are going to send an electric current through his voice box. You place the electrodes on either side of the larynx and ask the patient to say "O." "O" is a natural reflex to pain, and some patients, when given a good strong shock will shriek "O" at the top of their voice and are instantly cured.

This technique is useful not only in war neuroses but also in a number of cases that present themselves in civil life. Psychoanalysis is not necessary to effect these cures. Many of the patients have not a mentality of sufficiently high order to make them amenable to a psychoanalytic treatment. They can, however, be promptly cured by this type of suggestive therapy. If they are of sufficiently high mentality, it is worthwhile attempting an analysis *after* the cure. With the insight that the analysis gives them, it is less likely that the condition will reappear. I have known both analyzed and unanalyzed patients to be cured and remain cured for several years without any relapse.

Hypnosis has frequently been made use of in psychotherapy. It is, however, of doubtful value. There may possibly be some forms of physical disability of functional origin that would not yield to suggestive treatment, but would be more amenable to hypnosis. I have not, however, found it necessary to employ hypnosis for functionally disabled patients. They can usually be cured and sent away in the time that it would take to bring an ordinary subject into the hypnotic sleep.

B. TREATMENT OF MENTAL DISORDERS

Suggestive therapy has its chief value in the monosymptomatic functional disabilities. It is not applicable to the complex problems of real mental disorders. The psychotherapy, therefore, of the psychoneuroses must take on a different form. The physician who attempts it *must understand mental mechanisms.* He must know many types of behavior and their explanation, in order to get an insight into a majority of the queer phenomena that come into a psychiatrical dispensary. In my opinion, he will find that neither Freud nor Jung nor Adler nor any of the psychoanalysts in their particular theories, has found out the universal mechanism of all mental disorders. Freudian psychology is applicable with most probability of success to states of anxiety which, as we have said, are characteristic of a definite type of personality. The constitutional sublimator would probably yield more easily to Jung's type of psychotherapy. Jung's principle of synthesis is, however, applicable to all, and it is to be regretted that neither he nor anyone has worked out a technique of synthetic therapy. Adler enables us to understand many patients with a feeling of inferiority.

It is, therefore, necessary for the psychotherapist to have as wide an understanding as possible of the various psychoanalytic schools, and a deep acquaintance with the mechanisms of the human personality. In the light of this information, the physician studies the patient to find out the underlying cause of his abnormal behavior.

Procedure in the Case of Children.—The mode of procedure differs somewhat in children and in adults. In children, there

should always be a preliminary measurement of intelligence. For very young children, the Kuhlmann tests are available. For children four years old and over, Terman's revision of the Binet-Simon tests are probably the best. It is very important to know whether or not abnormality of conduct in children is due to a defect of intelligence.

Besides the measurement of intelligence, one should also have an insight into the home conditions. This is usually to be gained only with the aid of an adequately trained social worker.

One should also have a report from the school, so that one may know something of the regularity of attendance and the child's *rapport* with his teachers. Many abnormalities of juvenile conduct come from lack of a proper understanding between child and teacher, and the child's lack of appreciation of the value of elementary school instruction. This lack of appreciation is sometimes due to the inadequacy of parents and to poor home conditions.

With the information thus obtained from various sources the physician has a conversation with the child. He attempts first of all to gain his confidence, to talk over his difficulties. Perhaps he makes a mental examination in certain cases, according to the form given below for adults. With children, however, this is generally unnecessary. Conditions are simpler; the mechanism at the basis of the abnormality of the conduct is easily found, and a suggestion can readily be formulated for the improvement of the child's behavior. Such a suggestion, when given to the parents, to the court, or to the social organization interested in the child, should always be regarded as tentative. It should be checked up in a little while, and modified in the light of future developments.

Procedure in the Case of Adults.—When an adult comes to a physician or a clinic for mental help, his difficulties are usually of rather a serious nature. This, however, is not always the case, but the physician will readily see, after a few minutes examination, whether or not he is dealing with something that can be put off with a few words of friendly advice, or whether he is confronted with a serious mental problem.

In such cases, he makes a thorough study of the patient. This involves a family history in which the problem of heredity is taken up, a personal history, including the chief points of the patient's life, the diseases he has suffered from, his educational opportunities, his employment history, etc. Patients who come voluntarily are usually willing to give all the information that the physician desires. Institutional cases, and those that one meets with in military service are often more reticent.

After the family and personal histories, the preliminary step is the mental examination. I have developed the schema, given at the end of this chapter, for this examination which should be consulted while reading the following: It is based, to some extent, on our study of the pathology of the will.[2] The family and personal histories will enable one to answer the question of whether or not the patient's behavior is acute or chronic, and whether or not it involves hereditary factors. Besides this, it is useful to know what attempts have been made in the past to modify the abnormal conduct. This gives us an insight into the prognosis. If nothing has been done, it is more likely that assistance will modify conduct. If, however, everything possible has been done in the past, the physician approaches treatment with less hope of success.

One should inquire at the outset into the patient's plan of life. This and the whole mental examination in itself is a therapeutic procedure, and one of great value in many cases. Some mental problems arise from the fact that the patient has never made any adequate attempt to solve life's difficulties, and fill an honorable place in the world. It is a revelation to him even to think rationally on the subject. One approaches the problem by asking some such simple question as: "What is your outlook for the future? What are your plans? What do you hope to do with yourself?" One is surprised to find so often that patients have no plans. They have simply slipped into an ideal of life that aims at enjoyment but not at accomplishment.

One may then inquire cautiously into the presence of ideas of reference, suspicions, etc. Here one may get on the track of a

[2] Cf. *infra*, p. 368 ff.

whole system of delusions. Care should be taken in certain cases not to arouse suspicion in the patient's mind that you are examining him for "insanity." It is therefore better to put off to the end the inquiry into the presence of hallucinations and the patient's orientation in time and place. The memory for the dates of his life has already been obtained in taking his personal history. While taking this history, the physician asks age, year of birth, dates and ages of leaving school, going to work, marriage, etc. Gross deficiencies of memory will manifest themselves in the fact that there are two or more years' discrepancy in these figures. In the ignorant, wide margins are to be allowed.

By insight we mean whether or not the patient knows there is anything wrong with his mind. This can be determined from the general course of the examination or by a positive question.

The mood of the patient is often evident at a glance, and it is one of the facts of mental life that the patient usually has no objection to revealing. I have been in the habit of inquiring into emotional resonance with the idea of finding out whether or not the lack of this resonance is common in any type of pathological behavior. A person who is not affected by the sight of blood, who feels no sympathy with one who is injured, who is not angered when he sees animals cruelly treated, lacks something in his emotional life that tends to make for normal conduct.

In the mental examination it is necessary to know something about the chief sorrows and difficulties of the patient's life, what mental shocks he has experienced in the past, what are his present conflicts, what have been his dominant modes of mental adjustment, his psychotaxes and his parataxes in past conflicts with his surroundings.

We should then like to know whether or not there is any relation between his present behavior and his past complexes. This question is seldom to be answered from the superficial mental examination alone. We should also inquire into whether or not the pathological behavior is due to overaccentuation of impulsive drives. Has a taste for drink been acquired? If the individual is young, is there premature sex development? Very frequently pathological behavior is due to lack of correlation between sex

development and intellectual growth. One should also inquire into overaccentuation of the various forms of amusements, moving pictures, dances, etc.

Among the important items of information about a patient are any data we may obtain in regard to his moral stamina or strength of will. Think as we may theoretically about the existence or non-existence of will, its freedom or necessity, individuals do differ widely in their power of self-control. In studying a patient, the question always arises: Has the person before us little or no self-control, or has he at least in the past been able to manage himself and pursue a consistent plan of life in spite of difficulties? Fairly reliable information can be obtained on this point by asking the patient a few questions.

Defects of will, from one point of view, may be classified as due to unreasonable obstinacy or downright inability to keep a resolution. Ask the patient, do you remember any instances in which you have been unreasonably obstinate? Have you ever made any resolutions? If so, what? How long did you keep them? Against what difficulties did you contend in order to keep your resolution? Such questions yield to the physician a great deal of valuable information about the patient, and give the patient a helpful insight into himself and his own behavior. It is valuable also to try to decide whether or not lack of voluntary control is native and essential or due to the mere absence of interests and an adequate goal of effort. The previous inquiry into the patient's plan of life will give valuable hints on this problem. One should always bear in mind the fact that apparently hopeless mental problems have found a solution by awakening dormant will power by an adequate stimulus, that is to say, by the incitement of a goal that appeals to the personality of the patient.

Even in a mental examination, one should consider the presence of organic cerebral conditions. One should inquire into the possibility of an early encephalitis, or meningitis, malnutrition, infectious diseases of childhood, epilepsy, drug addiction, etc.

The accompanying schema summarizes the course of the mental examination. This will give us only what lies on the surface.

Special technique must be employed to discover factors which lie at the basis of many forms of pathological behavior. We have already given an account of these in the section on the study of the unconscious.[3]

I have found the method of dream analysis to be of special value in discovering difficulties that are really unconscious or which the patient withheld in the superficial examination. With some patients the Freudian method of free association leads to the desired result. Some patients report no dreams and decline to give any free associations. One then makes use of Jung's method of controlled association, and often obtains with it the desired insight.

This insight must then be skilfully imparted to the *patient*. He must be led to understand himself. The patient, after all, must, in the last resort, be responsible for the management of his own life. The physician will often be disappointed if he hopes to cure by analysis alone. If, however, by analysing he gives the patient a new insight into the mechanism of his conduct, he does the patient a real service and starts him on the road to permanent recovery.

What we have so far dealt with has been analysis, but analysis alone is seldom capable of working a cure. This is particularly the case when a patient is in an impossible situation. The physician must then supply a solution. The first step is usually the cessation of idleness. A rest cure is seldom necessary. Most patients need occupation. Some way must be found to get it for them. Those who have unreasonably given up their work should be told to go back to it. They usually protest that it is impossible, but the physician assures them that with the assistance they are going to have in the future, it will be possible. If the patient is out of work and has no way of obtaining it, the social service department must take up the problem and do its best to provide it. Or a member of the family must see to it that the patient does at first a few chores in the home. Naturally, the physician must take into consideration the physical capacity of his patient,

[3] Cf. *supra*, p. 37 ff.

but in my experience, neurotics have, in general, given up work without real necessity.[4]

From the study of the patient's life and surroundings, channels of sublimation must be opened. This is often relatively easy with the more or less intelligent. The adoption of a child has worked a transformation in some of my patients' lives. Religion is an outlet that should always be made use of whenever possible, that is, whenever there is a basis for religion in the patient's life. Religion alone can give a truly satisfactory solution to the problems of our existence, and it is most unfortunate that so many have never entered the sphere of its influence.

Cures of mental conditions are sometimes, but not often, sudden. The monosymptomatic functional disorder with a physical manifestation can promptly be overcome, but the mental readjustment of a patient who has lost his contact with reality is a more or less gradual process.

The therapeutic procedure here outlined has, I am sure, helped a number of cases. It does not cure all. There are many cases, especially those with a schizophrenic coloring, in which I suspect an organic factor. Psychotherapy should not be pushed with a blind ardor that would keep practitioners from considering the possibility of organic factors in mental disorders. The true psychiatrist will not only be on the lookout for new mental mechanisms in psychiatric literature, but will also turn to the results of physiological chemistry for light upon the problems that confront him.[5]

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[4] It should be noted that psychotherapy should not be practised except by one who is a properly qualified physician if serious blunders are to be avoided.

[5] For case histories and further information on the technique of Psychotherapy, consult Part IV, Chapters V-IX; and the references in the subject index under the headings, Therapy and Psychotherapy.

MENTAL EXAMINATION

Date..... No.....

Name.....M. S. W. D. Race. W. C. other specify.....

EXPRESSION.—Bright, dull, healthy, sick, sad, happy, anxious, indifferent. "Parkinson facies."

BEHAVIOR.—Normal, abnormal—specify. Evidence that conduct is acute, chronic, or hereditary.

ATTEMPTS MADE TO MODIFY CONDUCT.—Parental influence. Education. Special agencies. Clinical or private consultation with physician.

DEFECTS DUE TO ABNORMALITIES OF INTELLECTUAL LIFE.—Plan of life. If none given, determine it from patient's idea; if any, of what he wants to become, and his mode of seeking enjoyment.

Delusions. Ideas of reference, suspicions, false interpretations. (These may often be brought out by asking, is there anyone in particular who causes you trouble?)

Hallucinations.

Orientation. What day of week of month year season morning or evening What city building

Memory. Of dates of life. Recent events. Digit span.

Insight.

Defects Due to Abnormalities of Emotional Life.—

Mood.

Flow of Thought. *Ideas of Suicide.* *Attempts at Suicide.*

Emotional Resonance. Ask if patient is affected by sight of blood, seeing someone injured, animals mistreated.

Chief Sorrows and Difficulties of Life. Mental shocks.

Present Conflict.

Dominant Psychotaxes and Parataxes in Past.—

Relation of Present Behavior to Past Complexes.—

Defects Due to Overaccentuation of Impulsive Drives.—

Drink.
Moving pictures.
Sex, early ripening, indulgence.
Other amusements.

Defects Due to Abnormalities of Volitional Control.—Evidence of Unreasonable Obstinacy or Constant Yielding.—

Degree of Ability to Keep Resolutions.—

Flightiness of Purpose.—

Relation of Education and Training to Abnormality of Conduct.—

Defects Due to Organic Conditions.—Early or recent encephalitis or meningitis. Malnutrition in infancy. Relation of onset of behavior to infectious diseases of childhood.

Epilepsy.
Arteriosclerosis.
Mental defect.
Venereal infection.

Drug Addiction.—Alcohol, morphine, cocaine.

Physical Condition.—Chief points, particularly indications of endocrinopathy.

PART VI
VOLITIONAL CONTROL

CHAPTER I

VOLUNTARY ACTION AND THE ACT OF WILL

General Problem of the Existence of Will.—It cannot be doubted that the human organism is a complicated machine. The bones, the muscles, the nerves, the blood vessels, and the various organs of the body constitute an intricate mechanism. If we study its anatomy alone, we are likely to be impressed with the mechanical nature of its levers, of its system of vascular tubes through which flows the blood, pumped by the heart, the mechanical nature of its reflexes, etc. Nevertheless, when we look at our own inner life there seems to be something in our management of our own affairs that is not entirely the mechanical response to the forces of nature that are constantly playing upon our sense organs.

If we were to study the structure of an ocean liner with all its complicated mechanisms, we would never learn from the study just why it is that this enormous boat goes to one harbor rather than another. We might find the pilot-house and understand thoroughly its connection with the rudder, and still, though we had a clear insight into the mechanism of the steering, the mystery of the boat going into a particular harbor rather than to many others would be insoluble. There is a pilot in the boat, and he knows why he steers it one way rather than another.

The question now arises in regard to the human mechanism, is there a pilot-house and a pilot in the human machine? The chapters that follow are an attempt to study the steering-gear of the human mechanism and to find out, if possible, whether or not, over and above the steering-gear, some kind of piloting is done by a process which is not to be confounded with the workings of the steering-gear itself. Note in the first place that the question here involved is not the same thing as the problem of human freedom, a problem which is likely to arise first in the minds of those accustomed to the classic discussion of the will. It

is a problem more fundamental than the question of freedom, *i.e.*, is there any will at all? Is there anything to be free, is a question that must be settled before we discuss the freedom of the will.

The more common opinion in modern psychology is that there is no such thing as will in our mental life as something distinct from the commonly recognized elements: Sensations, images, and feelings.[1]

Ziehen, for instance, denies that there is any mental process termed will, and reduces voluntary phenomena to the phenomena of association. Bain and Wundt would explain the will in terms of feelings. The Cornell School regards will as nothing more than kinæsthetic sensations.[2] Ribot, who would be seconded by the modern Behavioristic school, would regard will as identical with the sum total of the organism's responses to its environment.

In view, therefore, of the many attempts to explain voluntary action without any will, it is necessary, in the first place, to ask ourselves just what evidence there is for some kind of piloting in the human mechanism. We may approach this problem by an analysis of those mental phenomena in which voluntary action is most apparent. Let us ask ourselves, therefore, what evidence there is of voluntary control.

Although many authors attempted to explain control, particularly control of movements, by sensations that arise in the moving member, it was pointed out by Strümpell[3] that even in voluntary movements there must be a central cortical control, and that sensations from the moving organ cannot completely account for all phenomena of control. Thus, for instance, it sometimes happens that an arm is completely deprived of sensation. It cannot execute movements when the eyes are closed. If,

[1] For introductory summary with some references to the literature, cf. R. H. Wheeler, "Theories of the Will and Kinæsthetic Sensations," *Psychol. Rev.*, Princeton, N. J., 1920, XXVII, pp. 351–360. The best summary of the experimental literature on the will is to be found in J. Lindworsky's *Der Wille*, Leipzig, 1923, p. 282.

[2] Cf. R. H. Wheeler, *An Experimental Investigation of the Process of Choosing*, University of Oregon Publications, 1920, Vol. I.

[3] *Deutsche Ztsch. f. Klin. Med.*, 1903, XXXIII, p. 25.

however, the patient is looking at his arm, he can execute movements with it. In such a case control does not come from sensations resident in the moving organ. Control comes from visual sensations. These must be brought to a centre, and there worked over and brought to the moving organ. Some kind of a central factor is, therefore, necessary in such cases. If, however, we analyze our own mental life, we find considerable evidence of voluntary control in its various departments.

Evidence of Voluntary Control.—Many authors, in considering the question of voluntary action, have been hampered in their attempt to deal with the problem by what is really an assumption based upon a metaphysical theory. Men say there can be no voluntary action, for voluntary action implies freedom, and how can there be freedom in a world in which all is ruled by the push and pull of mechanical forces. It is therefore necessary, they say, to consider our mental life without any reference to will. The facts must be forced into a mold in which there is no compartment for anything voluntary.

Before we lay down the laws of the possible and the impossible, let us look fairly and squarely at the facts as they are, and deduce all theories and conclusions from a consideration of the facts.

1. The first group of facts which merit our attention are the facts of attention. All writers on attention discuss, at least, the distinction between voluntary and involuntary attention. It seems impossible to consider attention without realizing that it has two very different forms. Some stimuli force themselves upon our attention. The explosion of a pistol in our immediate vicinity would instantly find its way to the focus point of our attention. Whether we would hear it or not would not be subject to voluntary control. On the other hand, one has often to force himself to pay attention to an uninteresting duty. It seems, too, however we may explain it, that we may attend to one thing or another just as we will. We have, therefore, a considerable control over the mental function that we term attention. There is no experimental evidence, and no empirical consideration of any kind whatsoever, to weaken in any way this natural and

necessary division of our acts of attention into two classes, voluntary and involuntary. The only objection that can be raised to it is that, theoretically, it is impossible. But, leaving aside theory, the fact is that we do turn our attention from one thing to another at will. There is something, therefore, in our mental life that directs our attention. It is not wholly determined by the stimuli from without.

2. If a person asks us to do something for him, we may accept the task or not, according as we please; or we may consider a course of action and we may resolve to follow it or reject it. Once such a resolution is made, it has a distinct effect on our mental life. It may flow over at once into action, or hours, days, weeks, months, years may elapse, during all of which time a certain set of mind perseveres. Evidently something of far-reaching import has taken place in our mental life. What is it that has adjusted our mind in this definite way? It is not intelligence, not the understanding of what is asked of us, not an insight into a course of action, but it is something which we may describe as a determination. There seems to be a power of resolution, which may not only decide a thing for a moment, but may adjust the mental life so that it takes a definite point of view over long periods of time. This power of submission, of rejection, of resolution, of perseverance in a determination is something real in our mental life. It is one way in which voluntary control manifests itself.

3. One of the earliest attempts to get an insight into volitional activity was by what is known as the reaction-time experiment. These experiments, as we have seen, were suggested by the attempt of an astronomer to record the exact time that a star passed the cross-hair of a telescope. Psychologists attempted to find out the interval that elapsed between the perception of the stimulus and the indication by a subject that he had perceived it through a prearranged signal. Thus, a sound was given and as soon as the subject heard the sound he raised his finger from a telegraph key. The apparatus was so arranged that an electric contact was made by a little hammer hitting an anvil and broken again when the subject lifted his finger from the telegraph key.

The interval between the make contact and the break is the subject's simple reaction time. After this simple reaction time had been measured, a compound reaction-time involving a voluntary choice was made the subject of experiment. In these compound reactions the subject, if he heard one signal, was to react; if he heard another, he was not to react; or if he heard one signal, he was to react with his right hand; if another, with his left hand, etc. Before his reaction, therefore, the subject had to make a voluntary choice to do or not to do; to do this or to do that.

With the development of introspective methods in psychology, minute studies have been made of what transpires in a subject's mind during a reaction-time experiment. Narziss Ach,[4] by an ingenius set of conditions, adapted the reaction-time experiment to a study of the will. He was enabled to analyze an act of choice into the following elements: (1) The sensory element, *i.e.*, the kinæsthetic sensations; (2) the intellectual element of the idea of the end to be obtained and the ways and means of realizing it; (3) the essential element, *i.e.*, the consciousness of willing; (4) the dynamic element or the feeling of effort.

Coffin[5] and Wheeler[6] have attempted the same analysis and they feel that the kinæsthetic sensations are capable of accounting for voluntary action without any assumption of Ach's essential element involving a voluntary *fiat*. Miss Calkins[7] has found, however, in Wheeler's own results non-sensory elements which he himself apparently did not recognize.

My own experience with the reaction-time experiment makes me feel quite certain that volitional activity does two things: (a) It produces a readiness of the organism to react to a given stimulus. This readiness is accompanied by kinæsthetic sensations but probably is something far deeper in its nature than the sensa-

[4] *Ueber den Willensakt und das Temperament*, Leipzig, 1910; *Ueber den Willensakt und das Denken*, Göttingen, 1910.

[5] Joseph Herschel Coffin, *An Analysis of the Action of Consciousness Based upon the Simple Reaction*, Thesis, Cornell, 1907.

[6] R. H. Wheeler, *An Experimental Investigation of the Process of Choosing*, University of Oregon Publications, 1920, Vol. I.

[7] "Fact and Inference in Raymond Wheeler's Doctrine of Will and Self-activity," *Psychol. Rev.*, 1921, XXVIII, pp. 356-374.

tions coming from the muscles themselves.[8] (b) There is a moment of willing which sets off the mechanism that is made ready in the preliminary stages. It is not a sensation of the stimulus alone which discharges this mechanism, but the voluntary *fiat*.[9]

It is thus seen that the analysis of the reaction-time experiment gives us evidence of specific voluntary control in the human mechanism.

4. In our emotional life we have another sphere of volitional control. It is true that we cannot increase or decrease the intensity of our feelings and emotions at will, just as we can directly influence the intensity of a muscular contraction. Nevertheless, there is some possibility of indirectly influencing our emotional life. This is done by the direction of attention.

Emotions, as we have seen, are reactions to intellectual insights into a situation; if we go over and over again in our mind the meaning of an insult, and all that it implies, we certainly can intensify our anger and indignation. If we turn our attention to other things, the emotion is likely to die away more quickly. It is possible, however, to do more than this. If we attempt to make a psychological analysis of an emotion, to bring the emotion before the focus point of consciousness, not its cause but the emotion itself, it melts away like wax in front of a hot fire. Emotional states, as such, cannot be brought to the focus point of consciousness, and any attempt to do so makes them dwindle away at once.

We have, therefore, a certain possibility of emotional control. Attend to the cause of the emotion and you strengthen it. Attend to the emotion itself, analyze it as such without reference to its cause, and you weaken it. It takes, however, considerable ingenuity in the pilot of the human mechanism to make a psychological analysis of any violent emotion, or to turn the mind away from

[8] Cf. *infra*.

[9] The inadequacy of the energy of the stimulus to account for the actual reaction is pointed out by Woodrow who showed that the reaction time at the onset of a prolonged stimulus was the same as at the cessation of such a stimulus. There is no energy imparted to the organism by the cessation of the stimulus. Touching off the reaction, therefore, is not due to the stimulus but to internal conditions. Cf. above, p. 77.

a consideration of the facts that brought about the emotional outburst. What is it that exercises this control over the human mechanism when an attempt of this kind is made? Certainly it is not a kinæsthetic sensation that exercises this control. It may result in kinæsthetic sensations, but it is not possible to say that kinæsthetic sensations are the forces that shuffle our ideas and turn our attention from one thing to another.

5. In the conflict of impulses and desires that we have considered above, we have found evidence of a distinct power and force that has every right to be termed volitional in character. Impulses and desires drive to action. Nevertheless, they do not always result in action. The reason for their failure is not always that they are counterbalanced by other impulses and desires. There is an inhibitory mechanism which has its roots in our intellectual life. This brings up before the mind ideals of conduct whose tendency is to inhibit the action to which the impulses and desires may drive. Experience shows, however, that the ideals of conduct in a conflict of this nature have a natural tendency to steal away into the background of consciousness. Experience shows that there is an actual power and force to maintain them before the mind. What is it that is acting in this way? Is it a kinæsthetic image? Is it a feeling of pleasure or of pain? No, it is a force that seems to flow from the personality itself that holds before the mind ideals that inhibit an activity that is contrary to their dictates.

6. When a person has some serious mental trouble so that his previous plan of life must be given up and a new one made, the pilot of the human mechanism has considerable trouble and difficulty in working out a readjustment to life and its problems. Some have a tendency, as we have seen, to slip away from the reality and to do nothing. One may fight against it, and by sheer force break the shell that surrounds him. One may have a tendency to brood mournfully over his unhappy lot. It takes an effort to do away with this useless melancholy, and to take up life's duties and find interest and content in other lines. And after one has made a new plan of life it is not easy to adhere to it, however rational and reasonable it may be. It takes a power

and force back of the personality to carry out the plan and come to a final and satisfactory readjustment to conditions as they are.

Does a kinæsthetic sensation coming from the twitching of the muscles of the shoulder or neck perform all of this for an individual? Is it done by feeling happy or feeling sad, tense or relaxed? No. It is a specific force or power that adjusts and readjusts the contrary and blind forces of human nature and makes them work harmoniously. If one considers these various points of evidence, one cannot escape the conclusion that there is something in our mental life to which we may give the term "voluntary control."

The next question that we have to take up is the analysis of what this voluntary control is.

The Act of Will.—Psychologists are divided on the question of the simplicity of the act of will. Some recognize a simple, unitary act. Others point to the complexity of all voluntary action. To think clearly on this point one must distinguish between voluntary action and an act of will. A voluntary action is a complex affair. One voluntary action differs profoundly from another precisely because it is complex and the elements of which it is composed are not always the same. A reaction-time experiment is not the same thing as a readjustment of our whole life after some serious failure, and yet both are voluntary. The profound difference between voluntary actions does not, however, exclude the presence in all of them of some one unchanging and identical element. We may ask ourselves, is there any evidence to show that in all voluntary action there is one unit control of the various forms of mental activity? Several considerations urge this conclusion upon us.

First of all, each human being is one living unit organism. Many human beings exhibit also in their mental life a unit plan, in virtue of which all activity is subordinated to one dominant ideal. The stronger the personality, the more complete the subjection of everything in the mental and even physical life to this dominant ideal. The weaker the personality, the less complete is the subjection of his various activities to a unit plan of life. Unity of action means unity of control.

Secondly, if we analyze our conscious experience in all of these forms of voluntary action, it seems to us that it is always one and the same ego that is active. There is a conscious unity of the personality that underlies all forms of voluntary action. It is the personality itself that accepts a task, that pays attention to one thing or another, that gives the *fiat* in reaction-time experiments, directs the attention in emotional control, maintains the ideals of conduct before the mind in any conflict of impulses and desires, and readjusts life to new conditions after painful disappointment, etc.

It would thus seem that the act of will is a unit experience that enters into a complex, but is not in itself complex. Like all mental phenomena, it is an activity of the substrate of our mental life, of the ego, the psyche, the soul. It is an activity not of reception, but of reaction to stimuli and conditions. This reaction is not necessary as in a reflex action, or in pleasure or pain, but is perceived as different from any of these necessary reactions, and bears a characteristic peculiar to itself which we describe as that of an act of will.

But, it may be said, if an act of will is a mental element, it must have its attributes that characterize it. It must have its quality, its intensity, its duration. Our next question, therefore, is, what are the attributes of will as a mental element?

Attributes of Will as a Mental Element.—Each one of the elements of our mental life has some specific characteristic that distinguishes it from every other element. The sensation of red has that peculiar quality and characteristic that we term redness, differentiating it from other colors, distinguishing it from sounds, tastes, etc. If now an act of will is a mental element, it, too, must have its quality. This quality is precisely its voluntary character. Some acts in our mental life certainly do have this characteristic of being voluntary. All serious resolutions about important affairs appear to us as voluntary. Definite decisions as to actions are felt by us to be voluntary. Decisions as to truth, however, do not appear as voluntary. The proposition that I perceive to be true forces its truth upon me. Not so with actions which I have done and perceive to be good or bad.

No acts in our mental life, except those that are referred to the will, have this characteristic of being voluntary.

Sensations, images, emotions, arise within us whether we will or no. We may produce them, and the act of choice by which we determine to seek them is voluntary. The sensations, the feelings, the images, in themselves, are not voluntary.

Furthermore, all acts of will have degrees of intensity, ranging from mere velleities to absolute determinations to do something, or to carry out a plan of action no matter what influences may contravene. Daily experience bears witness to the degrees of intensity of our acts of will.

An act of will has also a certain duration. One must distinguish the duration of the act of will itself from the perseveration of its effects. One may determine to do something at once or some time later. The time that it takes to determine, to make up one's mind, is a short period, but not infinitesimal. The effects of this choice upon our mental life are perseverance in a resolution and endurance, but the duration of these effects is not the duration of the act of choice itself. The first attempt to measure the duration of the act of will was made by subtracting the time of reaction in which the subject was required to distinguish between two stimuli from a compound reaction in which the subject had to make a choice. It was originally supposed that the remainder gave the duration of the act of will itself. It is probably not so. It, however, gives an upper limit. An act of will need not require longer than this interval, which was found to be sixty to eighty thousandths of a second.[10] When one must choose between ten alternatives, this upper limit is raised to 400 thousandths of a second.

It would thus seem that the act of will is a mental element with its own quality, intensity, and duration. Let us now inquire more closely into the mode of operation of a voluntary *fiat*. The sphere in which this is best known is that of voluntary movement. A study of voluntary movement will give us a deeper insight into the steering mechanism of a human organism.

[10] Wundt, *Grundzüge der physiol, Psychol.*, fifth edition, III, p. 461.

CHAPTER II

VOLUNTARY MOVEMENT AND THE THEORY OF IDEOMOTOR ACTION

In 1880, William James published in the *Anniversary Memoirs of the Boston Society of Natural History*, an essay on "The Feeling of Effort."[1] In this essay, and in the chapter on "Will" in his *Psychology*, 1890, he maintained, but not without some ambiguity, that the immediate antecedent of a voluntary movement is an anticipatory kinæsthetic image of the sensations involved in the execution of the movement itself. The main factor in the kinæsthetic complex he regarded as sensations coming from the surfaces of the joints.[2] He looked upon it as absolutely certain that "*Whether or no there be anything else in the mind at the moment when we consciously will a certain act, a mental conception made up of memory-images of these sensations, defining which special act it is, must be there.*"[3]

Further on[4] he modifies this reference to the sensations of movement and says that the mental cue for a movement may be either a resident kinæsthetic image or a remote image, *i.e.*, one from some other sense organ.

The necessity of resident kinæsthetic images, says James, exists mainly at the commencement of the learning of a movement. The more practised we become in a movement, the more remote the antecedent imagery tends to be. And here slips in the ambiguity. The next step is to make it possible for the "idea of the end" to make itself function as all-sufficient, and so to do the work of the articular sensations. And then he goes on to cite examples in which the idea of the end is expressed in terms which at least bear a conceptual and non-sensory or non-imaginal interpretation. This ambiguity in James' own mind is a witness to the insuffi-

[1] Reprinted in his collected *Essays and Reviews*, N. Y., 1920, pp. 151–219.

[2] *Psychology*, Vol. II, p. 489.

[3] *Op. cit.*, p. 492.

[4] *Op. cit.*, p. 518.

ciency of the ideomotor concept. For, had James attempted an analysis of this "idea of the end," he would have been led to recognize the value of the intellectual concept in every voluntary act.

Leaving aside the ambiguity of the latter part of James' discussion, let us ask ourselves the question: What is the evidence that a kinæsthetic sensation is the necessary antecedent or cause of a voluntary movement? For this position found wide acceptance after the publication of James' essay on "The Feeling of Effort."

Thorndike wrote, in 1913:[5] "The theory of ideomotor action has been, for a generation, one of the stock 'laws' of orthodox psychology." It is, therefore, worth while analyzing its evidence.

We may split the problem into two:

(a) What is the evidence that the immediate cause of a voluntary action is a kinæsthetic image?

(b) What is the evidence that every idea has a native tendency to realize itself in action?

A. A Kinæsthetic Image as the Cause of a Voluntary Movement

If one analyzes the evidence brought forward by James for his conclusion that a voluntary action is initiated by a kinæsthetic image, we find it is based on two groups of facts:

1. He cites several cases of anæsthesia in which the patients had no control over their movements unless they could follow them with their eyes.

2. He points out that similar conditions may be produced in hypnotic subjects.

He concludes, "All these cases, whether spontaneous or experimental, show the absolute need of *guiding sensations* of some kind for the successful carrying out of a concatenated series of movements."[6]

Having found out the necessity of *guiding sensations* during a

[5] *Psychol. Rev.*, XX, p. 91.

[6] *Op. cit.*, p. 490. A foot note on page 491 points out that in *some* cases the movement cannot be *started* without the kinæsthetic impression.

movement, he then, without any further intermediary evidence, concludes that the *memory-images* must be present in the moment of willing.

Later evidence on this point comes from experiments such as those of Miss Downey on handwriting.[7] Miss Downey attempted "to throw into relief the processes utilized in writing by eliminating or embarrassing some particular control." Thus, if a subject writes blindfolded, he no longer has the control of visual sensations over his movements. If he writes with his left hand, the kinæsthetic control acquired by the right hand is eliminated. Copying an image seen in a mirror, or attempting to write upside down, introduces still further complications. She found that some subjects were very much embarrassed by a disturbance of the visual factor, and that these subjects were much more disturbed by writing under distractions such as silent or oral reading, etc. It thus would seem that the sensory cue for writing in some subjects may be visual; in others kinæsthetic.

In another set of experiments the subjects were required to count by ones or twos, etc., on up to thirteen, and at a given signal to write their name or a simple phrase. In the intervals of counting there is a wealth of imagery, its amount varying with the difficulty of the task, and consisting in recurrent cues, each one of which produces a nervous set of the musculature which dies out gradually and springs into existence again with the recurrence of the cue. In most of the cases the subject reported a sensory cue of some sort as initiating the movement of writing. "The test furnished absolutely no introspective evidence for a non-sensory meaning-consciousness." (P. 130.) Unfortunately, however, no introspective reports are given, and it is impossible to check this conclusion. That the subjects were conscious of the task they were to perform, that they accepted it, goes without saying. This consciousness of the task, neglected in Miss Downey's report, may be, and no doubt was, present at times as an auditory image that was *understood* by the subject. Or if it was not represented in imaginal times at all, it was neverthe-

[7] June E. Downey, "Control Processes in Modified Handwriting: An Experimental Study," *Psychol. Monographs,* 1908, Vol. IX, No. 1, p. 148.

less present, dominating the whole situation, and was the prime factor in establishing the motor set of which she speaks.

If one critically examines the evidence for the ideomotor theory of the origin of voluntary actions, one sees that James produced no evidence whatsoever in support of his position. Whatever evidence he produced merely tended to show that *sensations* of some kind are necessary for the awareness of a movement when it is going on, or for its proper execution. But this is not the problem. The question is whether or not a mental image, kinæsthetic or visual, or any other kind, must be present in consciousness in order that the movement may be initiated. We shall see below that *sensations* from the moving member, or from the eyes, are necessary in order that a movement may be properly executed. But what about the image that starts the movement? There is no evidence in psychological literature to prove its necessity. But certain writers, without critically analyzing the evidence, have assumed that James has proved his point.

Studies, such as Miss Downey's involve another fallacy: That of supposing that the control involved in a new or unaccustomed movement must be found also in the acquired movement. When one is called upon, for example, to write his name upside down, it is necessary for him to develop some kind of an idea of how his name would look if turned upside down and write it in accordance with the geometry of the problem, or an inverted image if he has the power of inverting his imagery. But most subjects, though practised in copying sensations, have no practice in controlling their handwriting by the laws of geometry or inverted visual images. Or if one attempts the familar laboratory experiment of mirror-drawing, a very little introspection will show him the presence of a distinct kinæsthetic cue in directing his movements under this new form of procedure. But he is now learning a distinctly new visual-motor control. One has, by common human inheritance, a coördination between the eye and the muscles. This coördination does not lead to the result in mirror-drawing. A new one must be acquired. Is it safe to assume that all the stages found in the execution of a new sensory-motor coördination are present in an habitual motor performance? Habit may be pictured as involving a simplification of nervous

pathways. If that is the case, experiments, such as Miss Downey's, may not "throw into relief the control processes utilized in writing," but merely show us certain processes that come into play in learning *new* motor coördinations whether or not they were ever present in the earlier days when we commenced the laborious task of learning how to write.

B. What is the Evidence that Every Idea of a Movement has a Native Tendency to Realize Itself in Action?

James maintains that "every representation of a movement awakens, in some degree, the actual movement which is its object; and awakens it in a maximum degree whenever it is not kept from so doing by an antagonistic representation present simultaneously to the mind."[8]

The evidence on which he bases this conclusion is as follows:

1. If one analyzes his experience in a warm bed on a cold morning he will find that as soon as the idea comes to him, "Hello! I must lie here no longer," at a lucky moment when no contradictory suggestion is present, that it at once produces its appropriate motor effects. The problem, according to James, is not to explain how an idea produces its effects, but why it does not. It will flow over into action with mechanical necessity unless hindered by an antagonistic idea.

2. The popular games of mind-reading are in reality muscle reading, the idea expressing itself involuntarily in muscular contraction.

Again we find the actual evidence that James brings forward far too slender to support the broad span of his sweeping generalization.

Before examining the question further it is worth while noting that the ideomotor tendency of an idea is not essentially bound up with the problem of the necessity of a kinæsthetic image for the initiating of a voluntary action. All ideas might have necessary motor tendencies and no voluntary action require a kinæsthetic cue.

Let us now attempt to go more thoroughly into the evidence for the motor tendency of ideas of action.

[8] *Psychol.*, Vol. II, p. 526.

Can we say that some ideas of action have no tendency, when we discount the effect of inhibitions, to realize themselves in action? I know of no experimental evidence to settle this problem. We are, therefore, left to the analysis of everyday experience.

It can scarcely be doubted that the perception of an action gives us the idea of that action. When we pass along a crowded, busy thoroughfare, how many ideas of actions are impressed upon our minds. Some are walking in an opposite direction to ourselves. Some are getting on or off street cars. Some are standing on corners, others are entering stores. Newsboys are shouting the names of the daily papers, hucksters of their wares. Does the perception of these manifold movements produce tendencies in ourselves to get on and off the cars, to lean against the lamp-posts, to go into the stores, to shout the names of the evening papers or of the hucksters' wares? The only answer we can give is that we are conscious of no such tendencies.

But is there an unconscious tendency which remains unconscious because of our inhibitions? James might say that a person in polite society perceives no tendency to shout on the street, when he hears shouting, because of the inhibitions of his whole previous system of education and training. The tendencies are there, but they remain inhibited. They are inhibited also by present ideals and interests. I do not loiter when I see others loitering because I am walking with a definite end in view. The concept of inhibiting tendencies and the possibility that the ideomotor effects may remain unconscious makes it very difficult to prove that there are even some ideas of action that have no motor resonance leading to their execution.

Not only is this so, but when we look around for positive evidence that ideas of actions have motor effects, there is not a little to show that this is the case and, furthermore, it is perfectly clear that we are wholly unconscious of the motor resonance of some ideas.

Let us turn first to experimental psychology.

Störring, in 1906, published[9] a piece of work that can be evaluated in favor of the ideomotor theory of ideas. He had

[9] "Experimentelle Beiträge zur Lehre vom Gefühl," *Archiv. für die ges. Psychol.*, VI, pp. 316-356.

his subjects exert a maximal pressure on a dynamometer under the influence of three types of instruction:

(a) Simple preparation: React with a maximum pressure on hearing the word "now" which followed two seconds after "get ready."

(b) Sensory preparation: At the words "get ready" fixate the image of "now" with the thought in mind of reacting at once on hearing "now."

(c) Motor preparation: At the word "now" innervate the muscles to be used in the reaction.

The results showed that the intensity of contraction for the sensory preparation was 21.6 per cent.; for the motor 71.2 per cent. greater than for the simple.

Seeing that in both the sensory and motor preparation the idea of the movement was brought more vividly before the mind, its tendency to flow over into action is expressed by a stronger pressure on the dynamometer.

His pupil, Rose, in 1913,[10] working with a spring ergograph, obtained similar, but not such clear results for the influence of the idea on the intensity of contraction. He had four tasks:

1. Simple preparation—no definite instructions.

2. Sensory preparation: Pay attention mainly to the sound of the bell.

3. Motor preparation: Image clearly the movement about to be made.

4. Image the movement and at the same time innervate the muscles to be used.

The third instruction is of the type requisite to test the ideomotor theory of ideas. It resulted in a clearly marked shortening of the reaction time, but only a tendency to a stronger reaction was evident.

Turning to pathology, we have certain phenomena which, though not thoroughly understood, would seem to bear out the ideomotor theory of ideas. I refer to the conditions known as echolalia and echopraxia, now assigned, under the influence of Kraepelin, to the syndrome of dementia præcox. Certain præ-

[10] "Der Einfluss der Unlustgefühle auf den motorischen Effekt der Willenshandlungen," *Archiv. für die ges. Psychol.*, XXVIII, pp. 94-182.

cox patients, when addressed a question, instead of answering it repeat the last words of what they have just heard. This would find an explanation, on the assumption of the ideomotor theory, that every idea of an action tends to reproduce itself in reality. Normally we do not perceive the tendency to say the words we hear because, owing to the inhibitions of present tendencies and past habits, the incipient motor impulse dies out before it can get to the conscious level. When, however, mental degeneration proceeds far enough, inhibitions crumble, normal interests fade, and the motor tendency realizes itself in action. Echopraxia seems even more to bear out the ideomotor theory of ideas than echolalia. Præcox patients will imitate, in an apparently reflex manner, the action that another performs before them even though such a performance looks to be, and is, perfectly aimless and foolish. Clap your hands in front of them and they clap. Roll your forearms around each other and they will do the same, and once having started they will often continue without the apparent ability to stop a rhythmic movement they have begun. In these cases, to all external appearances at least, the patient gets from perception the idea of a movement and not only feels a tendency to perform it, but actually carries it into execution.

That at least some ideas, all of which are not ideas of movement, *express* themselves in involuntary muscular contractions, was shown in the very ingenious study made by Pfungst of Clever Hans, a horse that attracted the attention of all Germany by his wonderful feats of addition, his apparent ability to read, to tell time, discriminate colors, etc. Pfungst, by an ingenious series of experiments, showed (1) that the actions of Hans were dependent on his questioner knowing the answer to the problem proposed; (2) that it depended on Hans being able to see his questioner, and finally, (3) he showed that the cue was given unintentionally by involuntary movements on the part of the questioner.[11]

He then, in the laboratory, impersonated Hans and studied the involuntary movements expressive of certain simple ideas.

[11] Oskar Pfungst, *Clever Hans*, trans. by Carl Rahn, New York, 1911, pp. vi + 274.

"Very slight involuntary movements of the head and eyes which showed but little individual variation, and always occurred when the subject began to fix upon the concept, were the signs which I used as cues. As in the case of the movements expressive of the release of tension, which I discussed above, these movements, too, occurred without the subject being aware of them (except in those rare cases in which they had once or twice been especially pronounced). Indeed, it was very difficult, and in some cases almost impossible, for those persons whom I had initiated into the secret, to inhibit them voluntarily. 'Up' and 'down,' 'right' and 'left,' were expressed by movements of head or eye in those directions; 'forward' by a forward movement of the head; 'back' by a corresponding movement. 'Yes' was accompanied by a slight nod of the head; 'no' by two to four rapid turnings of the head to either side. 'Zero' was expressed by a movement of the head describing an oval in the air. Indeed, it was even possible to discover whether the subject had conceived of a printed or a written zero, for the characteristics of both were revealed in the head movements. I was later able to verify this graphically. With Ch. as subject, I made 70 per cent. correct interpretations in a total of twenty tests; with von A. as subject, 72 per cent. in a total of twenty-five tests. And, finally, I was able to interpret the signs without any errors at all. It was not absolutely necessary to look directly at the subject's face. Even though I focused a point quite to one side, so that the image of the subject's face would fall upon a peripheral portion of the retina, I still was able to make 89 per cent. correct interpretations in a total of twenty tests. This is not astonishing after all, when we recall that the periphery of the retina possesses a relatively high sensitivity for movement impressions, although its chromatic sensitivity is very low."[12]

Moreover, if an agreement is made that the observer will indicate "right" by moving his arm down, "left" by the opposite movement, the thinker, while commencing with the natural expressive movements to right and left, gradually forsakes them for up and down movements of the eyes or head.

[12] *Op. cit.*, pp. 106-108.

In a footnote, on page 107, the author very properly points out that these experiments do not conclusively prove that *every* thought process whatsoever is accompanied by some kind of muscular movement. Furthermore, it is well to note that the movements in question are movements of *expression* and not of *execution.*

It is, however, very interesting to learn that a number of simple ideas have typical motor expressions, and that the subject is not aware of the existence of the expressive movements. Some years ago, I carried out an experiment in which I tried to guess what the subject was thinking about, whether spades, clubs, hearts or diamonds. The experiment was continued on different days for nearly a thousand guesses. When looking at the subject's face I was able to get a percentage of correct guesses that would not have occurred by chance more than once in a thousand times. But when not looking at the subject's face my percentage of correct guesses fell to about the probable ratio of one in four. The subject was not aware of any movements nor was I conscious of the basis of my own judgment, though I attributed it at the time to the subconscious reading of involuntary lip movements.

To sum up: The theory of ideomotor action as propounded by James involves two distinct elements. One, that a kinæsthetic image must be the cause of voluntary movement. For this we found no evidence whatsoever. The second element is that the idea of a movement tends to realize itself in action. That this is universally true, is not demonstrated. It would, however, offer a satisfactory explanation of certain pathological phenomena if it were true. There is, moreover, strong evidence to show that some ideas have typical movements of *expression,* involuntary and unconscious, and common to a number of subjects.

If, therefore, the ideomotor theory of ideas be limited to the statement that some ideas have characteristic motor expressions, and some and perhaps all ideas of movement have a definite tendency to flow over into action, it may be looked upon as the expression of the facts as now known to psychology.

CHAPTER III

VOLUNTARY MOVEMENT AND THE THEORY OF CONCEPTUAL CONTROL

In 1906,[1] Professor Woodworth, of Columbia, outlined a theory of the cause of a voluntary movement which we may term the theory of conceptual control. The conclusion of this study is that "a naked thought can perfectly well perform its function of starting the motor machinery in action and determining the point and object of its application." (P. 392.)

Instead, therefore, of a kinæsthetic image being required, he maintains that this naked thought or concept of what is to be done may be the immediate causal antecedent of a voluntary act. This is opposed to the position of James, at least as his view is ordinarily interpreted.

The evidence on which Woodworth bases his conclusion is mainly the introspections of trained observers. He called upon his subjects to perform three classes of movements: (1) "Free movements, that is, such as communicated no motion to any external object, such as wagging the jaw, winking, opening the closed eyes, flexing or separating the fingers, and flexing the foot." (*L. c.*, p. 357.) (2) Instrumental movements, that is, such as involve the use of some instrument: Scissors, forceps, or dynamometer. (3) Choice of movements: Touch any object seen in the foreground, any part of the body, flex or extend the fingers, react to a sound with a movement of the hand or foot.

The result of careful introspection was that, in a large portion of the cases, no imagery of any sort appeared in consciousness. It was perfectly possible to think of a movement without experiencing any kinæsthetic image of it. He considered the question of verbal imagery as the possible antecedent. By this

[1] "The Cause of a Voluntary Movement," by Robert Sessions Woodworth, *Studies in Philosophy and Psychology by Former Students of Charles Edward Garman*, Boston and New York, 1906, pp. 351-392.

he means some kind of expression of the task in inner speech. He ruled this out as an adequate cause of the movement because he found such imagery, when present, too *general* to account for the *particular* individual movement made.

"I intend to do a certain act; my intention is particularized; if whatever imagery may be present is less particular than my intention and the act which results, then the image is not the adequate cue of the act." (*L. c.*, p. 383.)

"In the instances in which verbal imagery was reported by my subjects, it was sometimes ludicrously inadequate as a distinguishing mark of the movement that was thought of. 'I am going to move the thing from here to there' might apply to a thousand movements; the words cannot possibly have been the determinant of the particular movement made." (*L. c.*, p. 383.)

The argument so far is negative: Imagery is not the adequate cause of a movement: First, because it is sometimes wholly lacking; second, because when present for one reason or another it is inadequate, and, therefore, cannot fully account for the effect.

What is the adequate cause? Woodworth maintains that it is twofold: (1) The *thought* of the movement to be made; (2) a set or adjustment or temporary disposition of the nervous system. The evidence that a thought is actually involved is not clearly brought out by Woodworth, but only stated. It lies, however, implicitly in his data. Thus, if the only imagery one has in mind of the phrase "I am going to move the thing from here to there" is verbal, the *understanding* of this phrase must also be present in his mind. The *understanding* of the task is essential, and is often present as such, with nothing but verbal imagery as an accompaniment. I rather think it would often be present alone, as Woodworth implies later, when he speaks of a *naked thought* as sometimes the only antecedent cue. Verbal imagery without meaning would not determine anything. Express a task to a subject in an unknown language and let him repeat the words in parrot-like fashion, and it will not lead to the desired result. An understanding of what one is required to do is the essential prerequisite, and must be present in every case. This understanding or meaning or thought process must,

therefore, be present in order that any movement at all may be determined.

Over and above this Woodworth maintains that there must be a motor set. The introspective reports of his subjects recount the fading from consciousness not only of all imagery, but also of the thought process itself, just prior to the movement, the situation having resulted in an inner motor adjustment which is a partial determinant of the act that is to follow.

I can confirm the presence of this motor set from my own introspections in reaction-time experiments. It is especially evident in reaction experiments without a preparatory signal. It is a labile thing continually crumbling and being reformed under the determination to react in accordance with the task one has *understood* and *accepted*. It seems capable of being held in perfect condition for only a brief period of time, and then falls apart to be built up again under the influence of the concept of the task which hovers often in the background of consciousness. It comes spontaneously to a point, as it were; and it seems to one that if the signal to react coincides with this point, that the reaction takes place promptly; but that if the signal to react comes when the set has crumbled, that a short building-up process takes place before one can react, and thus, the reaction time is delayed.

The principal points of the theory of conceptual control are as follows:

(1) Neither kinæsthetic imagery nor any other kind of imagery is necessary for the initiation of a voluntary movement. It may be present, but if so, it is a non-essential, or perhaps, useless auxiliary.

(2) The efficient cause of a voluntary movement is twofold:

(a) The understanding of what is to be done.

(b) A neuromuscular set, specific to the movement to be performed.

(3) Guidance by sensations coming from the members of the body by which the movement is executed. We have not analyzed Woodworth's evidence on this point because a section will be devoted to the problem later.

To the two factors mentioned by Woodworth as elements in

the efficient cause of a voluntary movement should be added a third, *viz.*, volition itself. A task must not only be *understood*, it must also be *accepted* in order that a human being may execute it. This acceptance is a piece of volition, a definite mental experience, distinct from the understanding of the task and the resultant motor set. To neglect it in a study of voluntary action is to try to play Hamlet without the Prince of Denmark.

Angell's Criticism of the Theory of Conceptual Control

Professor Angell objected to the theory of conceptual control on three grounds.

1. "All the movements examined were too well-mastered, too habitual, to throw fairly into the foreground the sensory-ideational elements emphasized in gaining control of them."[2]

This objection implies that one may study the cause of an habitual movement to better advantage by confining his attention to non-habitual and unlearned movements. It assumes that all the factors present in learning a new motor coördination are also present in the well-learned and habitual movement, but have become unconscious. We have referred to this concept in discussing the work of Miss Downey.[3] Angell's assumption at all events is not to be admitted without demonstration. It seems likely that just as the supernumerary movements in performing a voluntary act dwindle with practice down to the bare essentials, so also the conscious elements in the initiation and control of a voluntary movement are simplified by frequent repetition. To find elements present in the learning of a movement would not guarantee their presence in the habitual performance. If then we are going to study the conscious antecedents of our ordinary everyday actions, it is necessary to study these actions themselves. And when we do, the causative influence of the kinæsthetic image dwindles to vanishing proportions.

Embryology tells us a great deal about the way our organs are formed, but it would not do to argue, for instance, that because the *truncus arteriosus* of the human embryo deploys into

[2] *Journal of Philos. Psychol. and Scientific Methods*, 1906, III, p. 641.
[3] Cf. *supra*, p. 323 ff.

two ventral and two dorsal aortæ with six pairs of connecting branches, that therefore, we should, by very careful dissection, be able to demonstrate all of these derivatives in the adult human being.

2. "The occasional inability to detect sensuous forerunners of the motor act," says Angell, "did not mean that its only cause was a naked thought, but simply that the verbal imagery of the task was present, which is but one of the various forms in which the remote idea of a movement may be expressed."

Angell overlooks the consideration given by Woodworth to the inadequacy of the verbal image. "Verbal imagery" is the refuge of sensationalists who attempt to explain all our mental life in pure sensory terms. When one is reading a book he may not have visual images accompanying every word, but who can deny the continuity of the flow of words? What are words but sounds, and what are sounds but sensations? Thus, they say, don't you see how sensations account fully for our mental life? If this were only an adequate explanation, how fortunate the student would be, and how easy the acquisition of a language. Learn to pronounce it and you could read and understand. But alas! that is not the case. We can pronounce without understanding and understand without pronouncing. Verbal imagery, as a mere *flatus vocis,* accounts for nothing. If verbal imagery is present and the *only* sensory material present, we can be sure of two things: (1) The verbal imagery is understood. (2) The meaning of the verbal imagery is a non-sensuous mental state. By thus having recourse to the *flatus vocis,* Angell admits what he denies in the objection that follows:

3. "The doctrine of naked thoughts is a psychological heresy. There are no such things as thoughts, and therefore, what is not cannot be the cause of that which is."

We shall answer this objection by pointing briefly to some of the evidence in favor of the existence of imageless mental concepts.

Imageless Concepts.—Owing to the growth of their science out of physiology, psychologists inherited a certain timorousness that prevented them for many years from launching out into

the sea of thought. They investigated the sensations so persistently and conscientiously that it became impossible for them to see anything but what absorbed their interest. And so, when some years after the rise of scientific psychology, such men as Külpe and Bühler and Woodworth commenced to talk of nonsensory mental content, the ears of the orthodox psychologists were offended by what they looked upon as a rash and unwarranted innovation. It will be impossible for us to outline here all the extensive literature that has appeared on this subject. But the sensationalists have experienced even more and more difficulty in attempting to encompass within the limits of their theory the facts that modern psychology has brought to light. They have dealt with the situation mainly by denial, as Angell does in the objection referred to above. Their method has been to make elaborate introspections of sensory experiences and point out that they can find no thought processes whatsoever, but many forms of imagery; and refer all evidence to the contrary to inadequate introspection and analysis. If one, however, examines one's own reports, one finds the evidence of what one denies, or reports under a nondescript name, such as "mood."[4] There is no real disagreement as to the facts of introspection, when one brushes away the attempts of the sensationalists to cloud what they themselves have found. The question is not, however, merely one of introspection against introspection, but there is, as we shall see, experimental evidence on the point.

Since the question before us now arises out of the problem of understanding the verbal instructions or the verbal imagery antecedent to a voluntary act, let us confine our attention to a few experiments on reading, on the understanding of propositions and the perception of words.

One of the earliest pieces of experimental work on this problem was an investigation of the flow of thought in reading. It has long been a serious problem with logicians to account for

[4] For instances of what is referred to here see T. V. Moore: "The Process of Abstraction," *University of California, Pub. in Psychol.*, Vol. I, No. 2. "Image and Meaning in Memory and Perception," *Psychol. Monographs*, 1919, Vol. XXVII.

the continuity of the thought processes in reading. The flow of thought in attentive reading is undoubtedly continuous. What is it that continues? It is not the visual imagery. This appears here and there like the pictures in a more or less profusely illustrated book. This was the object of the experiments just referred to. Taylor[5] had his subjects read a passage and check the points where a visual image appeared. The sparseness of the checks made it evident that visual images could not constitute the continuity of the thought processes. Furthermore, the more familiar one became with the meaning of the text by rereading, the fewer the number of checks, that is to say, the greater the reduction of the imagery. Erdmann does not shrink from the position that the continuity of the thought is merely the flow of words. But if this were so, there could be no difference between reading and understanding. But there evidently is such a difference. English logicians have constructed two mental worlds, a psychological world of images, and a logical world of thoughts. But after all, there is only one mind that both images and thinks. It is, therefore, with interest that one turns from the problem of reading to the problem of the understanding of sentences. This was thoroughly investigated by Bühler.[6]

Bühler gave his subjects such questions as the following to consider and answer by a simple yes or no:

When Eucken speaks of a world-historical apperception, do you understand what he means?

Was the Pythagorean maxim known to the Middle Ages?

Can you go from here to Berlin in seven hours?

Was Eucken right when he thought: Even the limitations of knowledge could not become conscious if man himself did not in some way reach out beyond them?

Can you calculate the velocity of a freely falling body?

His subjects reported to him what they experienced on read-

[5] "Ueber das Verstehen von Worten und Sätzen," *Zeitschrift für Psychologie*, 1906, Vol. XL, pp. 225-251.

[6] Karl Bühler, "Tatsachen und Probleme zu einer Psychologie der Denkvogänge," *Archiv. für d. ges. Psychol.*, 1907, IX, pp. 297-365; 1908, XII, pp. 1-122.

ing these sentences, and in arriving at their answer, yes or no. He then raised, first of all, the question: What are the constituent elements of our thought processes? We cannot answer such questions without thinking. What transpires in our mind when we think? There are first of all the sensations involved in reading; but this is by no means all. There are also sporadic images of the objects themselves or the words. There are various feelings and emotional phenomena and those peculiar mental experiences of doubt, astonishment, reflection, etc., to which Marbe gave the name *Bewusstseinslagen.* But over and above these, there are elements more constant, more essential to the thinking process, specific mental experiences without sensory quality or intensity, but which have degrees of clearness, certainty, liveliness; and these are the *thoughts* themselves. The essential elements of thinking are thoughts. "What enters consciousness in such shreds, so sporadically and in such a wholly accidental manner, as images in our thinking, can never be regarded as the warp and woof of the well-knit, unbroken fabric of our thought."[7]

Let the reader attempt to answer Bühler's questions for himself and see whether or not his conscious experience is made up of the muscular thrills of kinæsthesis, the more or less faded colors of visual imagery, tones, smells, tastes, feelings of pleasure and pain, tension and relaxation, excitement and depression, mere doubt or wonder or attention to something in general; or whether or not, over and above all this, he thinks of specific meanings and their relations; in a word, is thinking really made up of thoughts? If one thinks that his whole experience is sensory, let him translate Bühler's questions into pure sensory qualities, and try to make someone who has not seen the original even understand the question.

We do not, therefore, understand by imagining, but by thinking.[8]

[7] *Archiv. f. d. ges. Psychol.*, IX, p. 317.

[8] For a consideration of the apparently contradictory evidence from the Cornell laboratory see: T. V. Moore, "Image and Meaning in Memory and Perception," *Psychol. Mon.*, Vol. XXVII, pp. 2, 242 ff.

But words are simpler than complex propositions, and words representing concrete objects that may be seen and handled, would give perhaps results more favorable to the sensationalist's position.

With this in view, I measured the reaction time of subjects to the meaning of words such as lamp, scissors, axe, etc.[9] This reaction time, to the simple unanalyzed meaning, was compared with that to the visual image of the object, a kinæsthetic image of the object and a concept of the object's use. The average reaction time to meaning was less than that to a visual image and much less than that to a kinæsthetic image. In general, the reaction time to the concept of use is less than to the kinæsthetic image. In order to study verbal images, pictures were used, and the subjects had to react, now to the meaning of a picture, now to the name. The average reaction to the meaning was shorter than to the name.

What one can react to must be a definite psychological experience. It cannot be a nonentity as Angell maintains. It cannot be identified with the imagery that arises because it comes before the imagery. The meaning process, therefore, is a definite psychological experience non-sensory, *sui generis*.

It has also been shown by Agnes McDonough[10] that a meaning can form one term of an association. It must, therefore, be a definite mental structure. For the bond of association unites definite structures, not a structure and a function, much less a structure and a psychological nonentity.

What then is the nature of the ideas involved in voluntary action? To return to the verbal imagery, "I am going to move the thing from here to there." From the experiments we have reported it is evident that this can be no mere *flatus vocis*. These words have a meaning. It is this non-sensory, conceptual mean-

[9] T. V. Moore, "The Temporal Relations of Meaning and Imagery," *Psychol. Review*, 1915, XXII, pp. 177-225. "Image and Meaning," *Psychol. Rev.*, 1917, XXIV, pp. 318-322. "Image and Meaning in Memory and Perception," *Psychol. Mon.*, XXVII, No. 2.

[10] "The Development of Meaning," *Psychol. Monographs*, 1919, Vol. XXVII.

ing which determines the act. I *know* what "here," there" and "thing" mean in the present situation. This knowledge, plus the determination expressed by "I am going," determines the act. And so in all voluntary actions the fundamental and essential thing is to *know* what one *intends* to do. The value of kinæsthesis[11] as an adjunct is problematical, but the knowledge is evidently essential.

But how can an intellectual mental state be a determining factor in a concrete movement? It is not necessary to understand the *how* to be sure of the *is*. It is just as impossible for anyone to see how a kinæsthetic image, which after all is something psychical, can be the adequate or inadequate cause of a movement and it is not possible to show that it is.

Further Evidence on the Theory of Conceptual Control

Burnett attempted[12] a crucial test of what he termed the classical theory of volition. He found that he could execute movements much more rapidly than he could imagine their execution in either visual or kinæsthetic terms. Furthermore, the variation in rate from each other among the different kinds of movement is ten times greater for the actual than for the kinæsthetically imaged movements. This latter fact would indicate that the kinaesthetic image cannot determine the rate of movement.

Burnett's conclusions are much weakened by the fact that he himself was his only subject. Angell also objected that "no defender of the 'classical theory'' has ever contended that a premonitory image definitely precedes each step in a series of well

[11] The movements of the tongue and the kinæsthesis arising therefrom, have been excluded as an essential or even an important subsidiary factor in the thought process by the experiments of Agnes Thorson, working under Lashley. "The Relation of Tongue Movements to Internal Speech," *Journal of Experimental Psychology*, 1925, VIII, pp. 1–32. She finds that internal speech or verbal thought often takes place without tongue movements, and when such movements do occur they correspond to movements in overt speech in only 4.4 per cent. of the cases.

[12] Charles Theodore Burnett, "An Experimental Test of the Classical Theory of Volition," *Studies in Philos. and Psychol. by Former Students of Chas. Ed. Garman*, Boston and New York, 1906, pp. 393–401

established coördinations like tapping.''[13] If, however, the kinæsthetic cue fully determines the movement, it should also determine its rate. Burnett's experiments would indicate that there can be no correlation between the rate of tapping and the rapidity of an imaged series of movements. If the kinæsthetic image has anything to do with the rate, Angell, or any other supporter of the classical theory, would do a service to psychology by indicating how; and if it does not, what sensory cue adequately determines the rate?

Thorndike made two attempts[14] to extend still further the evidence for Woodworth's theory of conceptual control. His discussion unfortunately failed to hold clearly apart the two very distinct problems of the conceptual control of voluntary action and the tendency of an idea to flow over into appropriate motor channels.

He brought forward, however, a couple of considerations that should be borne in mind by anyone who makes the attempt to decide between James and Woodworth.

I. ''If I say to one, 'I shall name an act; when I name it, will to do it or will not to do it. Take a pencil and write your name,' and then ask those who willed to write their names, 'what was in your mind when you willed to write?' I shall by some be told, 'An image of myself writing my name,' or 'A visual image of my name as written.' But I shall, on asking those who willed *not to*, what was in *their* minds when they will not to, be told by some of them also *precisely the same thing.*''[15]

Thorndike argues from this that the image came as a consequence of the idea ''write my name'' rather than as a cause of the writing thereof. Assuming that the idea of a movement produces the appropriate kinæsthesis of its execution, the test clearly shows that this kinæsthesis does not necessarily result in the movement. Whether the idea is present in imaginal or

[13] *Journal of Philos. Psychol. and Sc. Methods*, 1906, III, p. 643.

[14] "Mental Antecedents of Voluntary Movements," *Journal of Philos. Psychol. and Sc. Methods*, 1907, IV, pp. 40–42; "Indeomotor Action," *Psychol. Rev.*, 1913, XX, pp. 91–106.

[15] *L. c.*, 1907, p. 40.

conceptual terms, nothing results without a *fiat* which determines the action.

II. We can will acts, the images of whose resident sensations are impossible. Most people do not know, and some years ago psychologists did not know, that the eye in reading moves across the page with a series of jerks. If you are told to read a line, turning your eye smoothly from right to left, you image a smooth movement, you execute a jerky one. No one really images his eye movements in reading. We conceive the end and execute it without being conscious of the necessary movements by any adequate sensory representation.

Summary

The discussion so far has made it apparent that:

(1) We have non-sensory mental states which may be termed concepts or thoughts.

(2) These concepts or thoughts are necessary in the determination of what we are going to do. We cannot perform voluntary acts without knowing what we intend to do.

(3) The concept or thought of an action is not sufficient of itself to bring it to execution.

(4) The kinæsthetic image does not appear in consciousness in the execution of many voluntary actions. Its value, therefore, is problematical, and demands a further study.

(5) Besides the representation of an action there must be a *fiat*, an act of volition which is the final determinant of a voluntary act.

(6) This *fiat* produces a neuromuscular coördination which may be maintained for a greater or less length of time in varying degrees of readiness for immediate execution, whenever the *fiat* involves a delay that is to be terminated at the giving of a prearranged signal.

Let us now turn to the consideration of the neuromuscular coördination and study how and in what way definite coördinations of this nature are at the disposal of the organism.

CHAPTER IV

KINETIC UNITS IN THE SERVICE OF VOLUNTARY ACTION

It is clearly evident that by a simple *fiat* of the will one cannot put himself in equal readiness for every kind of action. If one, who has never learned to play the violin, be given that instrument and be told to be ready to strike out boldly when the piano has played a few preliminary bars, how different the result from the attitude struck by the trained violinist under the same instruction. The one has nothing to call upon, the other has a neuromuscular coördination at his disposal, built up by years of practice.

This neuromuscular coördination may be termed more briefly a kinetic unit. There is one or more kinetic units of a more or less specific sort at the basis of every habitual action. Actions which are not in themselves habitual are made up of a number of such units that are thrown together to meet the immediate situation. Examples of such common units are walking, standing, sitting, writing, grasping, lifting, bending, etc.

The question now arises, what is the origin of these units? To what extent are they hereditary, and to what extent acquired?

It is only recently that we have obtained definite and reliable information on this subject, due to the labors of Professor John B. Watson, formerly of Johns Hopkins University. Watson undertook the systematic observation of children born in the maternity wards of Johns Hopkins Hospital. The results are published in an article by his student, Margaret Gray Blanton [1] and in a summary in the seventh chapter of Watson's *Psychology from the Standpoint of a Behaviorist.*

From the observations of Watson and Mrs. Blanton, it is clear that the child has at its disposal a number of ready-made

[1] "The Behavior of the Human Infant during the First Thirty Days of Life," *Psychol. Review*, 1917, XXIV, pp. 456-483.

kinetic units at birth. From the moment the child is born, it reacts to certain stimuli; not with random movements, but with definite motor coördinations. Leaving aside such reflexes as sneezing, hiccoughing, yawning, suckling, the child has, by common human inheritance, complicated motor coördinations such as are used in the voluntary actions of later life. It does not have to acquire these kinetic units by the trial and error method of developing habits, but they are present at birth or develop somewhat later without any apparent labor of acquisition. Take, for instance, such a complicated motor coördination as following a light or a moving object with the eyes.

Though this coördination of the eye movements in some newborn infants was imperfect, this was not the rule. A large percentage of the children observed would fixate a light at birth.

"Subjects S., A., M., F., and J., gazed at the light above the birth bed and also followed a moving hand. Subjects F. and K., neither of whom gazed at light or followed hand at birth, were seen to do both on the eighth day. Subject K., at eight days, subject R., at ten, and subject L., at twenty-six days focused first on one and then on another face. . . . A dim light, moved slowly at half a metre, was followed by subjects eight hours, eighteen hours, thirty-six hours, and 3, 4, 5, 6, 14, 15, 21, and 30 days of age. Subjects which did not follow were aged 9 hours, 3, 5, and 14 days; seventeen in all were tested."[2]

Grasping is a coördinate movement. One child was seen at birth to spread his fingers and close his hands four times in succession. We know no reason *a priori* why the fingers of a newborn child should act together rather than in a random incoördinate manner. But they do not. Not only is the grasping movement a native endowment, but it has such strength that some children on the first day of their life will support their whole weight with one hand. It is interesting to note that this reflex is more easily elicited from an angry child.

The child does not have to learn to locate the spot of every painful stimulus and how to get arm or leg to the point of irritation in order to brush it away.

[2] Mrs. Blanton, *l. c.*, p. 462.

"If a baby lies on its back with legs extended, and the inner surface of one knee is lightly pinched, the opposite foot is brought up almost with the regularity seen in the reflex frog."[3]

In most cases, however, preliminary movements are made, and it takes several seconds to locate the stimulus.

In spite of the demands of the recapitulation theory, a baby lowered in water at body temperature makes no swimming movements, but gives violent expression of fear and makes uncoördinated slashing movements of the hands and feet.

It is thus seen that a number of kinetic units are ready made at birth. Most, however, remain to be acquired. In his eighth chapter, on the "Genesis and Retention of Explicit Bodily Habits," Watson gives us a very interesting account of the eye-hand-mouth reaction. Experiments were commenced on the eightieth day with a stick of candy dangling before a child's eyes. When she did not take it, the candy was put into her mouth. The habit of grasping the candy and putting it into her mouth was acquired part by part. For fourteen days she never even grasped the candy. The candy was then put into her hand. She would put it in her mouth. On the 122d day, the candy was grasped for the first time and put into her mouth. On the 129th day, the candy was "worried" into her mouth. On the 150th day, the whole process required three seconds. On the 164th day, the last five tests took two seconds each.

We thus see that such a simple kinetic unit as grasping an article of food and conveying it to the mouth requires a definite stage of development. It is hard to elicit the first performance, which seems to be followed by rather rapid improvement after the first success, and finally, the slight gain in time and dexterity requisite for perfection demands a relatively long period of exercise.

Once, however, such a unit is acquired, it has a generic value. It may be used, of course, not only for one article of food but for anything at all, and is used, as is well known, not for food only but also for everything that attracts the interest of the child.

[3] Watson, *op. cit.*, p. 242.

The fact that a coördination appears some time after birth does not mean that it is entirely an acquisition by trial and error. The development of walking is partly, perhaps fundamentally and essentially, the unfolding of a kinetic unit of man's native endowment. This is witnessed by the sudden acquisition on the part of some children of the power of walking. Kirkpatrick gives the following account from a father who was unnecessarily worried because his child of seventeen months persisted in crawling, and refused to make any attempt at walking.

"At last we referred the matter to a physician, who said: 'It is a peculiar case, and I can hardly tell whether the difficulty is physical or mental. If there is no improvement in a short time, call me again.' Shortly afterwards I came home one day at noon, and placing my cuffs on a table in the sitting-room, threw myself on a lounge to rest. Katherine happened to notice the cuffs from where she sat on the floor, and, crawling across the room, pulled herself up by the leg of the table, and reaching out with one hand while she held on to the table with the other, took a cuff from the table and slipped it on, over her wrist. Of course, to do this she had to stand alone. I noticed it at once, and was surprised when she reached out her other hand for the other cuff and slipped that on, and then stood looking in a very interested way at the cuffs on both wrists. Then, to our great surprise, she turned towards me with a very pleased expression on her face and walked as confidently and as easily as any child could. Not only this, but she immediately ran across the room, through another room and around through the hallway, not simply walking, but running as rapidly as a child of four or five years would."[4]

The child continued to walk and run after this, provided she was allowed to wear cuffs, otherwise she would make no attempt.

Trettien[5] has collected a number of instances of children who acquired the power to walk suddenly. The habit depends, to a large *extent,* on the myelinization of the fibres of the motor tract.

[4] "The Development of Voluntary Movement," *Psychol. Rev.,* 1899, VI, pp. 76-7.

[5] *American Journal of Psychology,* 1900, XII.

Were children not urged to walk by their parents, the power would more often appear suddenly. Such a sudden appearance is not, after all, more remarkable than the coördination of eye movements at birth or the scampering of the colt just after it is born.

The adult individual possesses a large number of these kinetic units, some the result of the mere unfolding of native endowment, though perfected later by practice; others the result of the acquisition of coördinations that did not exist in the original constitution of the neuromuscular system.

Carmichael (*Psychol. Rev.,* 1926, XXXIII, pp. 51-58) has shown that the embryos of *Rana sylvatica* and *Amblyostoma punctatum,* which he allowed to develop in a solution of chloretone, very rapidly (i. e. in less than forty-five minutes) manifested coördinated swimming movements when transferred to tap water, even though prior to this time they had been "absolutely inert" and unable to respond to stimulation. He takes the position that swimming movements are due only in part to the maturation of a neural mechanism. Heredity, however, provides the essentials of such a mechanism in the ordinary process of growth. This is then rapidly perfected when the animal comes into an appropriate environment.

We may now approach the problem from the standpoint of pathology, which has made us familiar with a number of disturbances of voluntary action to which it has given the name *apraxia.* These apraxic disturbances may be conceived of as pathological influences which have in some manner destroyed the kinetic units. The kinetic units that are most frequently destroyed are those that were acquired by learning, such as the ability to make, on request, gestures, such as beckoning, threatening, etc., to make use of the arm in the movements habitual in one's trade, to dress and undress, etc. Those kinetic units which are more fundamental, such as breathing, swallowing, eating, turning the eyes in the direction of a stimulus, are usually preserved in apraxic conditions.

Apraxia may affect one hand and leave the other free. This type is frequently associated with a lesion in the precentral or postcentral gyrus of the cerebral cortex, and seems to be mainly

due to a disturbance of the motor elements in the kinetic unit in the former case, and the sensory in the latter. It may also be bilateral and may then be due to an inability to rightly interpret an object to be used and relate the sensation of preception to the act to be performed. As when a man, when attempting to put on his trousers "first flattens them out, then picks them up at the wrong end, turns them this way and that, finally lays them down, shaking his head because this once familiar act will not succeed, and then attacks the problem again."[6]

At other times it seems as if the "kinetic melody," as Monakow terms it, were forgotten. The individual elements are preserved, but they cannot be put together in the right order, and when the patient wants to smoke he puts the match in his mouth and strikes the cigar on the match box.

There must, therefore, be a number of delicate motor coördinations established in the brain which can be disturbed by the causes that bring on apraxia: Cerebral hemorrhage, tumors, sclerosis of cerebral arteries, tubercles, etc.

It is very likely, however that *there is no circumscribed area of the cortex which is alone involved in the mechanism of the kinetic units, but that the neurological mechanism of these units involves the whole cortex.*

"In all my cases," says Monakow, "where apraxia appeared as the result of a local cerebral injury and persisted as a lasting symptom until death, it involved, as we have seen, very large or multiple foci of injury. These were usually situated in the left hemisphere. Sometimes they were scattered through both hemispheres. Sometimes they were associated with diffuse, though irregularly scattered, pathological changes such as cerebral atrophy, perivascular sclerosis, severe circulary disorders of the cerebrum, brain tumors, causing general pressure, cerebral œdema, hydrocephalus, etc. In other words, in all the positive cases it was a question of a local disease or lesion of a brain that had suffered a general pathological disturbance either previously or at the onset of the local injury."[7]

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[6] Monakow, *Die Lokalisation im Grosshirn, Wiesbaden,* 1914, p. 498.

[7] *Op. cit.,* p. 548.

CHAPTER V

THE SENSATIONS INVOLVED IN VOLUNTARY MOVEMENTS

We have seen that in voluntary movements concepts are necessary. We must know what we are going to do before we can perform a voluntary action. We have seen, too, that mere knowledge is not sufficient. After knowing what we are to do, we must also decree that it shall be done. Besides knowledge, therefore, there is necessary also a specific *fiat* or act of will. Without an act of will, there is no voluntary movement. We have seen that imagery is of doubtful use as a precursor of voluntary movement. The question that is to be taken up in this chapter is, to what extent *sensations* are necessary in the execution of a voluntary movement.

Note that the problem before us now is not voluntary action in general, but voluntary movement in particular, and it may be well to point out, too, that we are not discussing here the necessity of images, but the necessity of sensations for the execution of a voluntary movement.[1]

There are several pathological cases that demonstrate beyond any question the necessity of some kind of sensation for the initiation and control of a voluntary movement. Perhaps the most remarkable case on record is one reported by Professor Schüppel in Tübingen.[2] The case was that of a young man who

[1] "The first mention of such impressions goes back, according to Sir William Hamilton, to a rather remote past. He tells us that two Italian physicians, Julius Cæsar Scaliger, 1557, and Cæsalpinus of Arezzo in 1569, quite independently of one another, were the first to recognize and definitely state that the exercise of our power of movement is the means whereby we are enabled to estimate degrees of 'resistance,' and that by a faculty of 'active apprehension' which was by them contrasted with touch as a 'capacity of sensation or mere consciousness of passion.'"

H. Charlton Bastian, "The Muscular Sense: Its Nature and Cortical Localization," *Brain*, 1888, X, p. 8.

[2] "Ein Fall von allegemeiner Anästhesie," *Archiv der Heilkunde*, 1874, XV, pp. 44-62.

suffered from a complete anæsthesia, except for a limited portion of the face, over the forehead, nose, eyes, lips, and chin. He also experienced pain in a few places of the body. Many cases of anæsthesia are hysterical in nature, and have no organic foundation. These hysterical cases are not good evidence in the present problem because we do not know to what extent any lack of ability in movement would be due to the lack of sensation or would itself be an hysterical phenomenon. If, therefore, we are going to find out what sensations are really necessary in the execution of a voluntary movement, we must have a real organic injury. There can be no question that Professor Schüppel's patient had an organic loss of sensibility, for in the autopsy it was found that he had been suffering from what is known as syringomyelia. There was a canal in his spinal cord that extended from the first cortical root to the first lumbar, widest from the fourth to the seventh cortical regions where the posterior columns also were destroyed. The pyramidal tracts were intact from the medulla to the second cortical, but below, more or less sclerosed. In life, movement was possible to this patient only under direction of the eyes. If he could not see his hands or his feet, he did not know where they were and could not move them. Thus, for instance, he made use only of his vest pockets, because he could see them and direct his hand to them. It was impossible for him to find the hip pocket because he could not see it. If during the night time the covers fell off of him in bed, in some way he experienced chilliness, perhaps through the chilling of the blood, but he could not cover himself for two reasons: First, he could not find the covers; and, second, he could not find himself. It is, therefore, clear that sensations of some kind are necessary in the execution of a voluntary movement.

Another classic case was reported by Strümpell.[3] A man received a stab wound in the neck which penetrated the spinal cord. Strümpell, on the basis of the evidence, diagnosed a destruction of the posterior horn and the outer fibres of the posterior columns. After some months had elapsed, allowing the inflammatory extensions of the injury to subside, the patient's right

[3] *Deutsche Zeitschrift f. Nerven Heilkunde*, 1902, XXIII, pp. 1-38.

arm could execute movements under control of the eyes, but not when they were closed. With his eyes closed he could not maintain his arm in a given position, but it would gradually deviate without his being conscious of any movement taking place. Movement under visual control was intact, but both superficial and deep sensibility were gone. It is clear, therefore, that some of the sensations that were lacking are necessary in the normal execution and control of a voluntary movement.

This conclusion is confirmed by the results of animal experiments. After cutting the sensory roots of one of the extremities of a monkey, Mott and Sherrington [4] found that movements of the part were seriously impaired. Since then the experiment has become a common laboratory exercise with the frog.

It is clear, then, that sensations of some kind are necessary in the proper execution of voluntary movements.

The will has no immediate control over the muscles, but indirectly, by way of the pyramidal cells of the cerebral cortex and the motor cells of the anterior horn of the gray matter of the spinal cord. Not only is this so, but the pathological cases and experiments we have just mentioned prove that sensations of some kind are necessary for the execution of a voluntary movement. Not only must nerve impulses pass from the brain to the muscles, but they must come back again from the muscles to the brain, that normal action may take place. The question now arises, what sensations are necessary, and whence do they come? The possible sources of sensations are as follows: The bones, the periosteum, the joint cartilages, the joint capsules, the subcutaneous tissues, the skin, the muscles and the tendons. The sources of evidence on the point may be grouped under the following headings: Anatomy, Psychological Experiment, and Pathology.

As far as anatomy is concerned, all of the above possibilities are to be considered with the one exception of the joint cartilages which are not supplied with nerves. They can, therefore, mediate no sensations whatsoever, but the bones, the periosteum, the joint capsule, the subcutaneous tissues, the skin, the muscles,

[4] *Proceedings of the Royal Society of London*, 1894-5, LVII, pp. 481-488. An experiment originally done by Claude Bernard. *Leçons sur la physiologie et pathologie du système nerveux*, Paris, 1858.

the tendons are all more or less richly supplied with sensory nerve endings.

In the muscles and tendons there are peculiar nerve endings whose structure suggests that they must have something or other to do with the sense of muscular contraction or kinæsthetic sensation. Their structure is so interesting and suggestive that it may be well to study these organs in detail.

Anatomical Basis of Muscular Sensations.[5]—Prior to 1850, muscles were supposed to be pure motor organs lacking in sensation. In this year Koelliker[6] called attention to fibres he had discovered, and which he considered sensory because their structure was different from that of the ordinary motor fibres.

Since then, the sensory neuromuscular end organs have been made the subject of many anatomical and physiological studies. Various forms of nerve endings have been found. The most interesting of these are the "muscle spindles," their interest arising from the fact that their structure suggests that they are specially adapted to respond to the contractions of muscles in which they are imbedded.

The muscle spindles are located in the muscle towards the tendon of insertion, or just before the point where the muscle fibres pass over into tendinous fibres. In the tissue of the tendon itself lie similar organs, the neurotendinous end organs of Golgi, in which tendinous fibres replace the special muscular fibres of the neuromuscular end organs.

Though of various forms, simple and complex, a "muscle spindle" may be considered as being formed of the following elements:

1. Its outer limit consists of a *capsule* formed of two zones of tissue, (a) an outer layer of connective tissue which ties the

[5] The best article on this subject is that of Regaud, Cl., and Favre, M., "Les terminaisons nerveuses et les organes nerveux sensitifs de l'appareil locomoteur," Première partie, *Revue générale d'histologie*, 1904, 1905, Vol. I, pp. 1-140. Deuxiéme partie, II, pp. 587-685.

[6] *Mikroskopische Anatomie II*, also "Untersuchungen über den letzten Endigungen der Nerven. 1. Abth. Ueber die Endigungen der Nerven in den Muskeln des Frosches," *Zeitschr. wiss. Zool.*, 1862, XII, pp. 149–164. *Fide* Regaud and Favre, *l. c.*

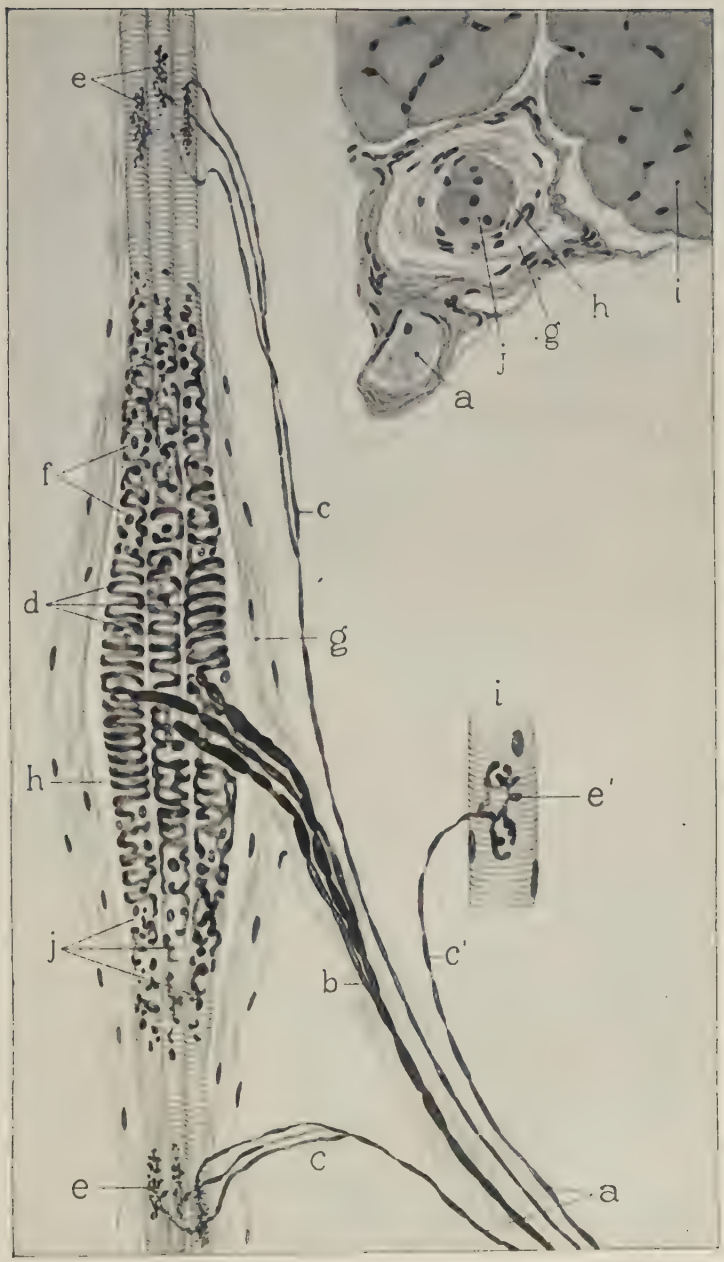

FIG. 7.—Upper right hand corner, cross section of muscle spindle from Sloth drawn from preparation loaned by Dr. George Wislocki. Below, semi-schematic drawing of muscle spindle. Corresponding structures in the two drawings have same lettering. a, nerve bundle; b, sensory fibres; c, motor fibres to muscle fibres in spindle; c', to surrounding fibres of muscle; d, sensory endings in spindle; e, motor endings in spindle; e' motor endings on surrounding muscle fibres; f, nuclei of spindle fibres; g, capsule; h, lumen of capsule; i, surrounding muscle fibres; j, intra capsular fibres (Fascicle of Weissmann). Muscle spindle drawn after schema of Regaud and Favre and drawings from nature by Ruffini (*Journal of*

muscle spindle to the interstitial connective tissue of the muscle; (b) an inner layer—the true capsule formed of layers of amorphous connective tissue with imbedded nuclei. These layers are separated from each other by endothelial cells.

2. Within the capsule filling its interstices, is a *liquid* of unknown composition, but probably of albuminous content. Golgi supposed that it was derived from the lymph vessels. Sherrington was able by injecting the lymph cells to fill the intracapsular space of the muscle spindles with Prussian blue. Regaud and Favre do not look upon Sherrington's experiment as conclusive, but think that the space is probably hermetically sealed because of the fact that it is always present in every muscle spindle. Were it open, it should often be found collapsed.

3. The capsule is traversed from end to end by a *fascicle of muscle fibres* (fascicle of Weissmann). They are much smaller in the adult than the ordinary surrounding muscular fibres, though in the fœtus they are almost one-third thicker than fibres that make up the body of the muscle. In the region of the insertion of the sensory nerve the muscular striæ more or less completely disappear, and a number of nuclei are crowded together. The signification of this remarkable structural peculiarity is unknown.

4. There are *two kinds of nerves* which enter the fibres. One type terminates in motor plates on the muscular fibre. The other, in typical cases, coils around the muscle fibre for a considerable distance. The motor fibre, which supplies the muscle fibre of the spindle, may not, however, terminate in the spindle but outside it.

Similar structures exist in the tendons—the neurotendinous end organs. In these, tendinous fibres replace the intracapsular muscular fibres.

Demonstration of the Sensory Functions of the Muscle Spindles.—As early as 1874, Sachs[7] demonstrated the presence of

[7] "Physiologische und Anatomische Untersuchungen über die sensiblen Nerven der Muskeln," Reichart und Du Bois-Reymond's *Arch. Anat. Physiol. und wiss. Med.*, 1874, pp. 175–195, 491–509, 645–678. *Fide* Regaud and Favre, *l. c.*, p. 11 ff.

sensory fibres in the muscles of the frog by a brilliant series of experiments.

1. He injected strychnine into a frog, thus enormously increasing the animal's reflex excitability. He isolated and sectioned the nerve to the Sartorius muscle. He stimulated the central end of this nerve, producing a general convulsion. The nerve of this muscle must, therefore, contain fibres which bring stimuli from the muscle to the cord.

2. If you leave the nerve intact and dissect out the muscle, the stimulation of the muscle at any point produces convulsions in the strychninized frog.

3. Cutting the anterior roots of the spinal nerves in a frog leaves some fibres undegenerated after six weeks. Cutting the posterior roots led to inconclusive results.

4. A thin muscle, such as the Sartorius, being exposed in the living frog under the microscope, Sachs found some fibres which caused muscular contractions when stimulated; others which caused no contraction.

These experiments demonstrate the presence of afferent nerve fibres in the Sartorius muscle of the frog and its nerve of supply. They do not show that the muscle spindles take up centripetal stimuli.

Cattaneo[8] attempted to find out whether or not the similar neurotendinous end organs undergo Wallerian degeneration. Cattaneo sectioned the posterior spinal roots of a dog. He does not specify which ones, nor how many, nor whether above or below the spinal ganglion. It is likely that he cut them central to the ganglion. The result was an ataxic gait, but no degeneration of the musculotendinous end organs. Sectioning the anterior root also left the end organs intact. They degenerated, however, on sectioning the sciatic nerve. He concluded that the neurofibrils are connected with centripetal fibres and are sensory in character.

[8] Cattaneo, A., "Organes nerveux terminaux musculo-tendineux, leur condition normales et leur manière de se comporter apres leur section des racines nerveux et des nervs spinaux," *Archiv Italiennes de Biologie*, 1888, X, pp. 337–357.

Sherrington, in 1894,[9] confirmed the results of Cattaneo.

Pathology teaches us the same lesson. The neuromuscular end organs are left intact in degenerations that affect the anterior horns of the spinal cord. Thus, Eisenlohr, seeing the muscle spindles in the degenerated muscles of patients who had suffered from infantile paralysis, thought that they were sclerotic areas.[10]

Pelliet[11] and Batten[12] found the muscle spindles intact in the degenerated muscles of infantile paralysis.

Forster found[13] in a case of diffuse myelitis with destruction of the cord, but intact spinal ganglia, that the neuromuscular spindles were still preserved.

The observers quoted by Regaud and Favre (*l. c.*, p. 80) found the muscle spindles intact in *tabes dorsalis.* But Brazzola,[14] in a case where the disease had progressed very far, found them degenerated. Whenever *tabes* goes so far as to destroy the spinal ganglia, it cannot be doubted that the muscle spindles will degenerate.

From all the above it is evident the muscle spindles send centripetal impulses to the cord, and probably thence to the brain. It is not, however, evident that they mediate for us *conscious* sensations.

There are two theories as to their mode of action.

Sherrington supposes that the pressure of the contracting fibres external to the capsule gives a mechanical stimulus to the intracapsular nerve fibres. He has even demonstrated that mere pressure or pulling on a muscle, dissected free from its tendon of insertion, causes a reflex contraction of the antagonists.

Regaud and Favre,[15] however, believed that the normal phys-

[9] *Journal of Physiology*, XVII, pp. 211–258. *Fide* Regaud and Favre.

[10] "Mittheilungen über anatomische Befunde bei spinaler Kinderlähmung," *Tageblatt* d, 59. *Versamml. deutscher Naturforscher u. Aertzte*, zu Hamburg, 1877.

[11] *Journal Anat. et Physiol.*, 1890, XXVI, pp. 602-616.

[12] *Brain*, 1897, XX, pp. 138–179. *Fide* Regaud and Favre.

[13] "Zur Kenntniss der Muskelspindeln," *Virch. Arch. Path. Anat.*, 1894, CXXXVII, pp. 121–154. *Fide* Regaud and Favre.

[14] *Memorie della R. Accademia della Scienze dell instituto di Bologna*, 1890, Serie V, Tomo., pp. 465-496.

[15] *Op. cit.*, p. 86.

iological stimulus of the muscle spindle in the contraction of the intracapsular muscle fibres (fascicle of Weissmann) which stretches the nerve fibre coiled about them. These fibres are supplied by collaterals coming from the same nerve fibre that supply the extracapular muscle fibres. A part of the current, therefore, that goes to the body of the muscle must go simultaneously to the muscle spindle. The histology of the muscle spindle strongly suggests the view of Regaud and Favre. But, if it is true of the muscle spindle, what is to be said of the analogous organs of Golgi in the tendons, where tendinous fibres take the place of the fascicle of Weissmann?

After careful consideration of the anatomical evidence, Regaud has suggested the following association between the various forms of nerve endings and specific forms of sensations coming from the organs and tissues involved in movement:

I. KINÆSTHETIC SENSATIONS

1. Muscle spindles, end organs, whose chief function is to react to the degree of contraction of the muscles, and thereby give us information about the position of the members of the body.

2. Neurotendinous end organs. These terminations are especially adapted to react to intense muscular effort and give information about the degree of resistance experienced.

3. Corpuscles of Ruffini. These are found about the tendons, the periosteum, the ligaments and capsules of the joints. These, according to Regaud, are specifically adapted to respond to tension of the fibrous organs.

4. Paciniform corpuscles. These are located around the joint, and, according to Regaud, are specially adapted to respond to external pressure.

II. PAIN SENSATIONS

Regaud understands by this, various nuances of the sense of pain. He supposes that the free ends of the nerve fibres mediate for us sensations of pain.[16]

Let us now turn to the experimental and pathological evidence.

[16] C. L. Regaud, "Les terminaisons nerveuses et les organes nerveux sensitifs de l'appareil locomoteur," Deuxieme Partie, *Revue générale d'histologie*, 1907 II, fasc. 7.

Joint Sensations.—That kinæsthetic sensations are functions of articular motion was made evident by the experiments of von Frey.[17] He enclosed the arm in a rigid sleeve and hung weights close to the joint and at some distance from it. With slow movements of lifting, those weights appeared equal that would be balanced by another force, acting at the other end of the lever; that is, they appeared equal when they had the same moment of rotation. Since now the force at the other end of the lever is the muscle attached by its tendons to the bone, it seems likely that the judgment of identity comes from sensations resident in the motor organ, *i.e.*, muscles and tendons. If this is the case, then the sensations may be spoken of as functions of articular motion, but need not be articular sensations themselves. This, indeed, was the conclusion drawn by von Frey. We may now ask ourselves: Could not the joint surfaces be the source of the sensation? Thus, the degree of pressure between the articular cartilages must vary with the moment of rotation of the force acting on the arm. Could not this give rise to the sensations involved? This is one of the earliest views of the kinæsthetic sense. Oehrwall[18] says it was first propounded by Lewinsky[19] and is to-day generally accepted. Histological evidence and physiological experiment rule it out completely. There are no nerves in the joint cartilages or the cartilaginous disks found in some joints.

Goldscheider[20] himself, in his animal experiments, could obtain no reflexes by stimulating the articular cartilages, and concluded that they acted as if they were without any sensation whatsoever.

Lennander[21] made use of a patient with a cut that slit open

[17] M. v. Frey, "Studien über den Kraftsinn," *Ztsch. für Biologie*, 1914, LXIII, pp. 129-154.

[18] *Skandinavisches Archiv. für Physiologie*, 1915, XXXII, p. 221.

[19] "Ueber den Kraftsinn," *Virchow's Archiv.*, 1872, LXXVII, p. 141.

[20] *Ges. Abh.*, II, 287.

[21] K. G. Lennander, "Ueber lokale Anästhesie und über Sensibilität in Organ und Gewebe," *Gesammelte Werke*, I, pp. 138–142, Upsala, 1912, cited by H. Oerhwall, "Der Sogenannte Muskelsinn," *Sk. Arch. f. Physiologie*, 1915, XXXII, pp. 217-245.

the knee-joint to test the articular cartilages for sensitivity to pressure and pain, but found them insensitive. In a student who had to undergo an amputation, he made more extensive experiments. He found the joint cartilages insensitive to touch, hard pressure, heat, and cold. (17°—60°.)

Goldscheider[22] thought that by passing a faradic current through a joint he could reduce the interior joint sensibility. As a matter of fact, when one does this, the power of discriminating passive movements is considerably decreased. But just what happens here is not immediately clear. The sensibility of the skin around the joint is reduced. Pillsbury,[23] however, showed that the sensitivity of the joints is decreased by passing the current through other joints than those involved in the movement. It would thus seem that something besides sensation from the joint in motion is involved in the perception of movement.

Von Frey[24] found that by anæsthetizing the skin in the neighborhood of a joint, one raised the threshold; but the same result was obtained by anæsthetizing the skin at a distal joint. Furthermore, stretching the skin with adhesive-plaster lowers the threshold. He also obtained the same results with faradization, as did Pillsbury. He also experimented on a patient two months after he had undergone a resection of the elbow-joint, that is, an operation involving the removal of the joint surfaces with a saw, and placing a strip of *fascia lata* between them. By analogy with the skin, one would not expect a notable return of sensibility at the end of two months. Von Frey found, however, that there was no diminution of sensibility to passive movement. He concluded that the perception of passive movement could not depend upon sensations originating in the joint.[25]

[22] *Gesammelte Abhandlungen*, 2 Vol., Leipzig, 1878.

[23] "Does the Sensation of Movement Originate in the Joints?" *Am. J. of Psychol.*, 1901, XII, pp. 346-353.

[24] Von Frey, M., and Meyer, O. B., "Versuche über die Wahrnehmung geführter Bewegungen," *Zeitsch. f. Biologie*, 1917–1918, LXVIII, pp. 301–338.

[25] "Ueber Bewegungswahrnehmungen und Bewegungen in resezierten und in anæsthetischen Gelenken," *Zeitsch. f. Biologie*, LXVIII, pp. 339-350.

Also, "Weitere Beobachtungen über die Wahrnehmung von Bewegungen nach Gelenkresektion," *l. c.*, 1919, LXIX, pp. 322-330.

From all of these experiments and observations it seems clearly evident that sensations from the joints are a minor, if not a negligible factor in the perception of passive movements.

Sensations from the Skin.—Both von Frey and Pillsbury argue from the experiments we have just cited, that sensations from the skin must be involved in the perception of passive movements. But any sensations from the skin that may be involved cannot be ordinary touch sensations, for there are a number of pathological cases which show that touch may be practically normal and yet the sensation for passive movement and for the position of the members is profoundly disturbed.[26]

On the other hand, there are a number of cases where touch is more or less completely destroyed, and the sensation of movement is preserved.[27]

Skin Pressure.—Schlesinger called attention to a mode of sensibility that he spoke of as skin pressure. He measured it by a pair of graduated spring forceps that clamped a fold of skin, and indicated the strength of squeezing that is necessary to give a feeling of pressure. He found, in some of his cases, that this sense might be lost, and the sense of deep pressure remain which is measured by placing a weight on the skin of the arm, hand, etc. It may also be present or lacking when the mere touch sensation of the skin is preserved or destroyed. This sense, however, cannot account for the sense of active or passive movements, for in two of his cases (No. 12 and No. 20), the superficial pressure sense was destroyed, and the sense of active and positive movements was preserved. In the same manner the deep pressure sense may be ruled out as the source of our perception of movement.

[26] Ad. Schmidt. "Auffällende Störung des Lokalisationsvermögen in einem Falle von Brown-Séquardescher Halblähmung," *Deutseh Zeitschrift f. Nervenheilkunde*, 1904, XXVI, pp. 323-325.

Also, Curschmann, Hans, "Ueber Syringomyelia dolorosa mit ausschliesslich sensiblem Störungen," *Berliner klinische Wochenschrift*, 1920, LVII, pp. 1184-1187.

Gilles de la Tourette, "Un cas de Syringomyelie," *Nouvelle Iconographie de la Salpètrière*, 1889, II, pp. 311-317.

[27] *Die Syringomyelie: Eine Monographie von Dr. Herman Schlesinger*, second edition, Leipzig, 1902, Case 2, data, p. 445.

We may, therefore, say that some form of sensibility which is not usually tested in our experimental studies is the source of our perception of active and passive movements.

Sense of Tension.—Strümpell's clinical insight has enabled him to pick out what is probably the form of sensation that is essential in the perception of movements. In his *Lehruch der Speziellen Pathologie und Therapie,*[28] he writes as follows:

"Our judgment of the position of the members of the body and the passive movements that may be executed with them, does not depend exclusively on the sensibility of the muscles, but probably also on the sensibility of the joint surfaces, corpuscles and ligaments. All these parts, as well as the skin, are displaced and stretched in ever-changing degrees in various movements. Nevertheless, I believe that, as a matter of fact, the changing condition of tension in the muscles themselves and their tendons makes possible our judgment concerning the position and movements of the members of the body. Many investigators have thought that the judgment concerning the degree and direction of passive movements depends upon the sensibility of joint surfaces rubbed against each other. I do not believe it, because I have repeatedly examined patients with joint surfaces that have been completely resected, who, nevertheless, perceived the slightest passive movements in the parts concerned with absolute exactness and correctness."

It would thus seem that Strümpell lays chief stress upon what we may term our *sense of tension.* It is this sense of tension that is most likely responsible for the perception of movements. This does not mean that touch sensations are excluded in a normal individual. Thus, the rubbing of the clothes in any movement in practical life aids its perception and perhaps its control. Pressure upon the skin and the muscles themselves in extreme flexion are undoubtedly factors. It is likely, also, that one joint differs from another joint in the relative value of the various elements of the kinæsthetic sense. But pathological cases show that joint sensations are not necessary, that touch is not necessary, that skin pressure and deep pressure are not necessary; but that there is

[28] Eighteenth edition, 1912, Vol. 2, p. 272.

something over and above these that when destroyed makes the sense of passive movement impossible. Strümpell is, therefore, probably correct in attributing this to the sense of tension in the subcutaneous parts of the body. It is perhaps also possible that the skin itself has a tension sense different from the touch and pressure sense, although, so far as I know, the threshold of this tension sense has never been measured. Von Frey's experiments, referred to above, in which he increased sensibility for passive movement by stretching the skin, would indicate that the tension sense is localized in part, at least, in the skin itself.

We have seen, too, that Regaud suggests that there are two forms of end apparatus that may be involved in perception of movement—one the Pacini type of corpuscle, adapted to pressure; the other the Ruffini type of corpuscle, which seems more adapted to stretching. It is, therefore, likely that the sense of tension has its own end organ.

Active and Passive Movements.—Wundt analyzes the kinæsthetic sense into two components. If a movement is made, a weight of some kind is lifted by the moving member, and it is lifted to a certain height. The mass times the height is the measure of the work done. The mass is related to the energy expended by the mechanism of the muscles. The height is related to the position of the lever system that the bones constitute. If someone else moves my arm, that is to say, if a passive movement is executed, one of these components falls away. I can, therefore, no longer judge by any sensations which come to me from the expenditure of energy, but I am left to make a judgment purely on the basis of whatever sensations come to me from the position of the arm itself.

Pathological conditions also make a distinction for us between the perception of active and of passive movements. For there are a number of cases on record in which the patient lost the sense of passive movement, but retained his perception of active movement.[29]

Neurologists are wont to measure these two perceptions in the following way. Passive movement is measured by moving a finger of the hand, or the hand itself, or the forearm, or the leg,

[29] E. G. Schlesinger, *op. cit.*, Case 5, Case 10, Case 17, Case 38.

etc., and asking the patient to speak as soon as he perceives the movement. Normal patients perceive the slightest change in position of the members of their bodies. Active movement is measured by placing, *e.g.*, one arm in a certain position of extension or flexion and asking the patient, with eyes closed, to place the other arm in a precisely similar position. To do this the patient must perceive the position of the one arm and be able actively to imitate this with the other arm.

The perception of active movement must also be distinguished from the power of coördinate movement. A patient may be able to copy exactly the position of one of his members by placing the other in a similar position, but still be unable to make a coördinate movement by which he would, *e.g.*, touch his nose with the tip of his finger easily and without any wavering.

From the disassociation between the perception of active and passive movements, present in a number of patients, we may argue that they do not depend upon the same factors. The loss of perception of active movement always involves a much greater disturbance than the loss of perception of passive movement. The perception of passive movement probably depends upon the tension sense of skin and subcutaneous tissues, muscles, tendons, etc. But what is it that gives us the power of feeling the movements that we make ourselves?

The Feeling of Innervation.—J. Müller, in his *Handbuch des Physiologie des Menschen*,[30] suggested that when the muscles are innervated there may be an accompanying central feeling of innervation. The authority of Müller gained for this idea a friendly acceptance in the scientific world, and the feeling of innervation was looked upon by many as a fairly well-established sense. William James attacked the idea in his essay on the feeling of effort (1880), and embodied the criticisms of that essay in the chapter on "Will" in his *Psychology*. Müller and Schumann[31] argued against the feeling of innervation on the basis of their experiments on the comparison of weights. They found that if a weight of 676 grams be compared with one of 826 it will always be perceived, at the outset, as lighter. If

[30] Bd. 2, S. 500.

[31] *Archiv. f. d. ges. Physiol.* (Pflüger), 1889, XLV, pp. 37-112.

the 826 gram weight be now compared with one that is considerably heavier than it and then again compared with the standard of 676, in the second comparison, the heavier or 826 gram weight seems equal to, or even lighter than the standard of 676. They argued that this phenomenon cannot be explained by a feeling of innervation, for evidently, in view of having become accustomed to the heavier weight, the 826 gram is lifted with a stronger impulse than previously. If the strength of the impulse measured is indicative of the feeling of innervation, then the stronger impulse should make the weight feel heavier instead of lighter. They, therefore, concluded that there was no possibility of accounting for this illusion on the theory of innervation.

If the feeling of innervation were the only factor in the perception of an active movement for the lifting of weights, it would be very difficult to account for the illusion studied by Müller and Schumann. If, however, the feeling of innervation is one factor in a complex in which sensations from the moving member are normally important parts, it is quite easy to see that when the stronger impulse is not associated with the expected sensations of resistance from the object lifted, that it would seem much lighter than it really is. Müller and Schumann's exclusion of this explanation by saying that it is too complicated does not rule it out. In fact, their experiment with the lifted weights does not constitute a crucial test of the theory.

On the other hand, those who favor the theory have appealed to illusions of patients with amputated arms and legs, who, when they intend to make a movement, feel that it actually occurs and are often capable of carrying out complicated movements with the phantom member. Though the feeling of innervation might account for these phenomena, they are capable of other explanations (*e.g.*, mere kinæsthetic imagery of the movement), and they do not constitute a crucial test or an absolute demonstration of the existence of the feeling of innervation.[32]

[32] Wundt's analysis of illusions, obtained in patients suffering from external strabismus, is strong evidence of the feeling of innervation. He shows there that James, who makes use of the same phenomena, bases his argument on an incomplete representation of the facts. *Grundzüge der Physiologischen Psychologie*, fifth edition, Vol. II, p. 27 ff.

Pathology gives clear evidence that when there are no sensations that come from the moving organ, the mind is nevertheless capable of perceiving active movement. If this is the case, there must be something or other akin to a feeling of innervation. The above cases which we referred to, of the loss of the sensation of passive movement without that of active movement being at the same time destroyed, are evidences of this fact. The following case, however, carefully studied by Lashley,[33] is very strong evidence in favor of some kind of perception of muscular innervation. A man had a gunshot injury to the spinal cord, resulting in partial anæsthesia of both legs and paralysis of the muscles below the knees. The region around the left knee was anæsthetic to touch. Deep pressure was felt in this region only when a stimulus of from 2000 to 3000 grams was applied over an area of one-half inch in diameter. Flexion and extension were still possible in the left knee-joint. Careful experiments showed that the patient had no sense of the position of his leg. He could not detect passive movements in a speed of less than twenty centimetres per second. This, under the conditions of the experiment, would equal about 25° per second. He could not maintain the leg in a fixed position with the eyes closed.[34]

The subject could not imitate a movement of flexion or extension when a pattern was given by the experimenter moving the leg through a given angle. In such experiments he sometimes would flex the leg when the pattern called for an extension. Lashley tried to investigate the presence of afferent stimuli from the muscles and tendons. To do this he had the leg work against a spring and make a movement equal to three inches. The stronger the action of the spring, the shorter was the movement made by the subject. Under such conditions the subject perceived no difference between a movement of 33° flexion and 13° extension. It is to be noted, however, that the subject felt

[33] Lashley, K. S., "The Accuracy of Voluntary Movement in the Absence of Excitation from the Moving Organ," *American Journal of Physiology*, 1917, Vol. 43, pp. 161-194.

[34] Lashley unfortunately does not say anything about the eyes, but leaves us to conclude that the eyes were closed in these experiments. He does not say whether a fixed position could be maintained under visual control.

the resistance. The subject's sense of movement was so impaired that when his leg was forcibly extended during his attempts to flex it, it nevertheless seemed to him that he had executed the movement of flexation, or when the leg was held so that no movement was made, he nevertheless felt that the movement had actually taken place. This illusion could be explained by a feeling of innervation.

From this set of experiments Lashley concluded that there were no sensations from the actively moving limb sufficiently specific to give a clew to the nature of the movements. When, however, the subject was called upon to make a movement himself, he never made an error of direction. He could also, when working without assistance, make a movement of 0.5° to 8° with about the same accuracy as a normal subject. The more quickly the subject executed a movement, the more accurate it was. When, however, the leg was working against a strain, the actual movements, judged as equal, grew progressively longer.

"The progressive increase in the length of movements estimated as equal seems almost certainly the result of frequent repetition of the movement. From the subject's statement it seems probable also that the increase resulted from some feeling of resistance or of increased effort necessary for the movement which led to an over-compensation."

Lashley also investigated the relation between the duration and extent of the movement and found "a degree of independence in the rate and extent of the movement which precludes the possibility that the extent of the movement is determined merely by the control of the duration of the excitation of the motor pathways." (P. 186.)

Lashley concluded that in the absence of excitation from the moving organ, the accuracy of its voluntary movement cannot depend on reflexes originating in sensations resident in the organ itself. Control must be exercised by the brain. There must be a set of some kind prior to the execution of a movement which determines its direction and duration.

We may ask ourselves whether or not this set is the voluntary *fiat*, the act of will itself, and nothing more. It cannot be doubted that ultimately the degree of movement depends upon the *fiat*.

But is it possible that over and above the *fiat* and sensations from the moving organ, there is some other kind of perceptual data by means of which the type and degree of the movement may be distinguished? This evidently must be the case. Thus, for instance, the muscles and nerves can themselves be normal and yet the feeling for active movement may be considerably disturbed.[35]

There is also evidence to show that the mere thought of a movement brings about an activity in the motor area of the cerebral cortex that is accompanied by vascular reflexes leading to a change in blood pressure. The perception of these reflex changes, and perhaps other associated sensations, as Wundt suggests, may constitute the feeling of innervation.

Ernst Weber,[36] experimenting first on animals that he had curarized,[37] found that stimulation of the motor cortex causes a rise of blood pressure in the carotid artery and at the same time a decrease in the blood volume of the viscera.

Turning then to man, he made plethysmographic experiments, and found that voluntary movements, *e.g.*, in the foot, caused an increase in blood volume of the arm due to a general rise in blood pressure which is accompanied by contraction of the visceral blood vessels. This increase in blood volume of the arm may also be caused by hypnotizing a subject, and in the hypnotic state suggesting movement of some kind, *e.g.*, running. Under such conditions an increase in blood volume in the arm is even more marked than that obtained by actual movements of the foot. If one attempts to will a movement and think of a movement without actually executing it, one obtains a similar increase in blood volume in the arm, but not so quickly, and after a longer length of time, and when it does occur, it is not so marked in intensity as in hypnosis or in actual voluntary movement. This increase in

[35] Cf. E. G. Müller, H. Franz, "Syringomyelia mit bulbären Symptomen," *Deutsches Archiv für Klinische Medicin*, 1894, LII, pp. 259-299.

[36] "Das Verhältniss von Bewegungenvorstellungen zu Bewegung bei ihren Körperlichen Allgemeinwirkungen," *Monatschrift für Psychiatrie und Neurologie*, 1906, XX, pp. 529-554.

[37] Injection of the drug curare blocks nerve impulses to all voluntary muscles of the body, thus rendering it impossible to stimulate them by electric current. When therefore Weber stimulated the motor cortex of the brain, it could have no effect on the muscles themselves.

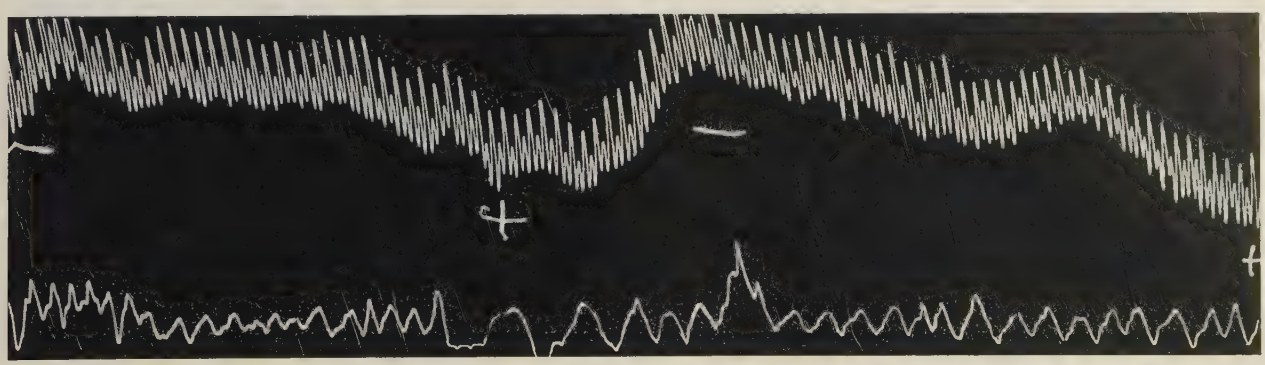

Fig. 8.—Hypnotic suggestion of wrestling match given at each + and terminated at −. Upper curve, blood volume and pulse of arm; lower, respiration. Curve reads from right to left. (Weber l. c. in text.)

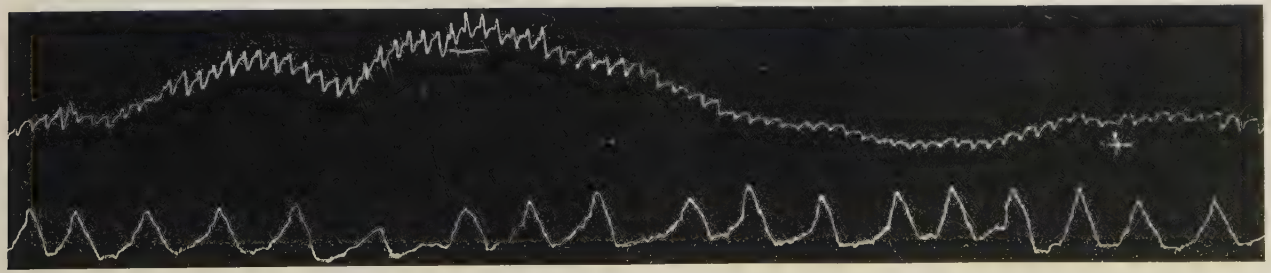

Fig. 9.—Voluntary lively imagination of gripping hand. Subject awake. Start at +, cessation at −. Curve reads from right to left. Upper curve, blood volume and pulse of arm; lower, respiration. (Weber, l. c. in text.)

blood volume during the hypnotic state does not take place if passive movements replace the active or suggested movements. Weber, therefore, concluded that the idea of movement causes in man the same phenomena as does the electric stimulation of the cortex in animals.

These experiments suggest very strongly that thinking about a movement[38] brings about some kind of change in the Rolandic area of the brain, a change which results in vascular reflexes producing a change in blood pressure, and thereby bringing about many sensations that could perhaps be factors in the feeling of innervation that precedes or accompanies the muscular contraction.

Summary

Let us now attempt to indicate, on the basis of the study we have just made, the nature and character of the sensations involved in voluntary movement.

I. The sensations found in passive movement are, in all probability, one element of the voluntary movement sensation complex, even though they may not be essential for the actual execution of the movement.

The form of sensation essential to the perception of passive movements is the feeling of stretching that comes to us from the skin and subcutaneous tissues. Regaud and Favre's observations suggest as its anatomical end organ the corpuscles of Ruffini.

II. The form of sensation essential to the voluntary direction of active movement is the feeling of effort. This is a complex which results from vascular reflexes giving rise to various organic sensations from increased blood pressure, and also from sensations coming, in normal individuals, from the muscles and tendons of the moving member. The end organs of these sensations are probably the muscle spindles and the neurotendinous end organs of Golgi. Visual sensations are capable of functioning in the place of sensations from the moving member itself.

[38] Whether or not this thinking of the movement is in terms of thought or of kinæsthetic imagery is not settled at all by Weber's experiments, but is left entirely open. Whatever one normally does when he intends to make a movement brings about the reflexes that Weber has found.

CHAPTER VI

THE PATHOLOGY OF VOLUNTARY ACTION

Pathology is a scientific study of the abnormal conditions of the organism underlying specific forms of disease. If, therefore, we are to study the pathology of voluntary action, we must assume that in the individual there may be definite abnormal conditions more or less constant in character that have something to do with the deviation of his behavior from the standard of normal conduct. That this may be the case will be evident on a little reflection. Voluntary action, as we have seen in our previous analysis, involves more than the *fiat* of the will. Even in a simple piece of voluntary action, such as the willing of a movement, we must suppose, besides the *fiat*, the integrity of muscle, nerve, and central nervous system. When we come to consider the complex behavior of a human being in the practical affairs of life, and pause to consider the numerous psychological mechanisms that are involved in conduct, we can readily conceive of a very extensive field for psychopathological study.

The utility of such an investigation is at once apparent. Any thing that gives us a clearer insight into just what is going on in a patient's mind in the course of his pathological conduct may help us not only to understand him, but may also, in many cases, enable us to modify his behavior.

With this problem in view,[1] I turned to the material in the files of my clinic and tried to study out the various conditions that present a kind of static background for abnormal behavior. To study all the conditions underlying pathological behavior would involve going over much of the ground we have already covered in the study of the unconscious, the conflict, and mental adjustments. Leaving these things aside, we may investigate certain other factors which, as more or less static or abiding conditions, profoundly influence conduct.

[1] Birnbaum's article referred to below, I found helpful as a preliminary orientation in this field.

Thus, for instance, we may ask whether or not abnormal behavior may be due to the fact that a person has inherited a constitution that is more difficult to manage than is usual, or which breaks down more readily under the stress and strain of life. A little experience with human nature will very quickly convince us that many individuals seem to have inherited something abnormal or have failed to inherit traits that pertain to normal human beings and, in consequence, find the management of life and its problems much more difficult than others who have been blessed with a better hereditary endowment.

On the other hand, pathological behavior seems, at times, to be due mainly to lack of proper training. At all events, it is conceivable that an individual may have an adequate hereditary endowment, but may, nevertheless, get into trouble because he has not been taught how to manage himself, and has not been shown the possibilities that life holds out for him. Again, pathological behavior might be due to a pure defect of volitional control, or to abnormalities of the intellectual or emotional life, etc.

Let us commence the study by first investigating cases which seem to be due to defects of training or heredity.

Defect Present with Lack of Training.—In February, 1922, a woman came to see me about her son, Francis, the complaint being that he was lazy and could not be interested in anything. As a matter of fact, the principal of the school he attended said that though the boy was respectful and well behaved, he was a shirker and failed in every study. He had threatened to dismiss him in the midyear, but the boy asked to be retained, and so he was allowed to drag through the first year of high school.

Mental examination showed that he was indeed dull, but not sufficiently so to explain his complete failure in everything. He was sixteen years and eleven months old, with a mental age, by the "Stanford Revision" of thirteen years and five months, and an intellectual quotient of eighty-four.

Light is thrown on the young man's condition by his early history, and particularly by the character of his mother.

She obtained a divorce from her husband, and when Francis was nine years old went into the moving pictures. Francis was

himself put on the stage while still a child and had some success as a singer and dancer. His schooling was irregular, obtained first in one place, then in another, according to circumstances.

An insight into his home life is given by the following report of a social worker who called on his mother.

Francis is living with his mother in his grandmother's apartment—two bedrooms, dining-room, kitchen. It is cheaply furnished, and dirty. Francis' mother came to the door in an old bathrobe and slippers, dirty and untidy. She was garrulous in her gratitude for the visit, and vituperative to her mother with whom she had to live, calling her frequently "this brainless woman," blaming her for her present condition in life and her early marriage, boasting that she is much finer than her family, and that they have continually dragged her down, etc., etc. She and her mother would both speak at once on the same or different topics. When the daughter became particularly abusive, the mother called her and all her children a lot of "bullheads"—said she "never could teach them anything," etc.

Francis walked down the street with the social worker. He told her that his mother got on his nerves. He has some affection, but no respect for his mother. There is some evidence that Francis' mother is openly immoral.

Francis gave the impression to several who have studied him that he is by no means hopeless in himself, but only in his present surroundings.

It is very difficult to say in any case that a condition is wholly environmental or wholly hereditary. In fact, in all abnormal human conditions, we must take three things into consideration: (1) Heredity, (2) environment, (3) activity or will itself.

The case of Francis appears on the surface as one in which the young man's environment was inadequate, and he did not get the training that would have enabled him to develop into a normal human being. He himself may be, in part, responsible for his own condition, and there may also be an hereditary factor. But cases such as this point out the possibility of human lives being wrecked merely by inadequate surroundings.

Defect Present in Spite of Training.—When a young man, well above the upper limit of feebleminded intelligence, cannot be interested in making something out of himself, is lazy, and shirks work, it cannot be doubted that there is some kind of defect in the voluntary control of his life. There is present a defect of the will or of voluntary action. In the case just studied, the defect is due perhaps to lack of discipline being exercised by the boy's mother and not to himself.

A man may inherit a wonderful violin of the best make of the old masters, but unless he is taught how to use it he will never draw forth from it a single melody.

A child may have fairly good native volitional ability, but unless someone trains him and implants ideals of conduct, it is not surprising if later on he does not manage himself and his affairs with ordinary prudence.

On the other hand, some children have no lack of training, and, nevertheless, develop later on an habitually incorrigible character. They do not merely slip occasionally into some delinquency, but are constitutional psychopaths. I have in mind a young man who was probably fairly bright. He did some of the eighteen year old tests, and then refused to do anything more. His father is a man of good character, and has tried to be severe with the boy. His mother, who has been perhaps too kind, but seems a reasonable, refined lady, tells me that the boy is lazy, has a vile tongue, and will neither study nor work. He desires only to have a good time, plays pool, and smokes cigarettes and loiters on the street corners all day. When refused money he borrows it from dealers with whom his parents trade. When he cannot obtain it in this way, he tries to steal it at home. He has given his mother fair warning that he will steal any money she leaves around. My attempts to reason with him only met with a smiling defiance.

Here is clearly a defect in the management of one's personal affairs. Something is wrong with the steering mechanism in this young man's mental life.

It is hard to say whether this defect is due to an hereditary cerebral defect or one that was acquired early in life by some

infectious disease, or that the mental condition was developed by repeated voluntary delinquencies. In his previous history, however, it is worth while noting that he had an infectious disease in infancy (fifteen months), diagnosed as whooping cough,[2] just about the time he was learning to walk and talk. After this disease he stopped walking and talking, and at two years and three months could only say a few words and did not really commence to talk again until about three years of age. His father, though he never drank to excess, was a constant drinker. His mother's father was a drunkard.

It is perfectly true, however, that every attempt was made from childhood up to make this young man what he should be. He was sent to good schools; his father and mother were well above the ordinary mental and social level; his training was not neglected, though there may have been mistakes in it (an overtender mother, and a father who was perhaps inclined to be too severe); but on the whole, the young man has had far better opportunity to succeed than most boys, in spite of which at present, he presents to us a complete failure.

He has not responded to his training. It may be that he himself is at fault, but there is definite indication in his history of organic defect, due to bad heredity and disease in infancy. He is perhaps a type of volitional defect that develops in spite of training.

Pathology of Voluntary Action Due to Impairment of the Will Itself.—Ribot, in his *Diseases of the Will*, classifies impairments of the will as due to defect of impulse and excess of impulse. If one studies the impairments he speaks of under the caption, "Excess of Impulse," one will see that in the terminology of this book they are not defects of the will itself, but are automatic actions, not truly volitional in character, or impulsive drives probably due to what we have termed above pathological associations. There is no such thing as a will that is pathologically strong. A man can no more have a will that is pathologically strong than a mind that is pathologically bright. Thus,

[2] Pertussis does at times leave disorders of the nervous system as serious complications.

for example, a man's muscles can never be too strong to manage the horses he is driving. He may not know how to use his muscles, but the fault would not be in the strength of the muscles but in the way he makes use of them.

Will is a mental force by means of which we control and regulate the impulsive drives of our nature. Impulse may sometimes be pathologically strong, but the will never. As a matter of fact, the impulses themselves are seldom too strong but are merely poorly balanced. It is possible, however, that the will may be pathologically weak, and yet, when I come to study over my material, I can find no case of a pure defect of will without any other accompanying symptoms. It is very difficult to be sure that weakness of will is the only thing involved in abnormal volitional activity; nevertheless, I think, the type of character that Birnbaum[3] speaks of really exists and is perhaps not so very rare. He refers to natures passive, but not dull, who, "in opposition to the indifferent, harbor lively desires; they really want what they desire to come about; but without their being obliged to do anything themselves, and because, as a general rule, this is not possible, they never get any further than wishing, and perhaps only a step further—to propose and resolve; but as far as carrying anything out that involves personal activity, the inner drive is lacking." The following case suggests, however, a will that was pathologically weak even though it had emotional difficulty to contend with:

On May 16, 1916, a man of forty, an hotel waiter by trade, visited the clinic complaining of weak spells accompanied by dizziness and a feeling of flushing in the head. He had been troubled with these spells for about six years, and attributed their origin to a mild drinking spree during which he became dizzy and had a pain in his heart. These spells had recently worried him so much that he had given up work. His savings bank account had dwindled to seventy-nine cents. His wife was supporting the family by working as a washwoman. The home was neglected,

[3] Birnbaum, Karl, "Die Krankhafte Willensschwäche und ihre Erscheinungsformen," 1, *Grenzfragen des Nerven und Seelenlebens*, Wiesbaden, 1911, XII (Heft 79), p. 75.

the children improperly clothed, and he spent the greater part of the day in bed brooding over what might happen to him in one of his spells.

Physical and mental examinations were negative. He had good muscles, and no reason could be found why he should not work.

He was reassured as to his health, and the Social Service Department obtained employment for him in a hotel where he went to work in a borrowed suit of clothes. His wife was spoken to and urged to cease scolding him and treat him affectionately and coöperate in the policy of reassurance. He continued to have occasional pains in the heart region, and about ten days after he had commenced work resigned his job in one of these spells and came to the clinic to have his heart examined. He was again reassured and given a note to his employer, and urged to start a savings bank account. He did not, however, present the note and returned on the next clinic day complaining of bladder pains. He was again reassured and urged to go back to work. This he did a few days later only to give up his job less than a week later, complaining of the same old dizziness, and also of a heavy feeling in his throat.

He was again reassured and his wife urged to be patient a little longer and not to scold. This time our efforts were crowned with success, and he remained at work, and in July, 1919, he came and proudly showed me his bank account in which the last deposit had raised his savings to a round one thousand dollars.

And here the story might have happily ended. But in the course of the winter of 1919-20, during my absence from Washington, he commenced again to vacillate between his bed and his job. A physician urged him to have his teeth pulled, which he did. He was very much frightened at the loss of blood and conceived the idea that his system was depleted beyond recovery. I was unable, in the fall of 1920, to persuade him again to go to work. He said it was too late, and only after much persuasion was his wife able to get him to visit the clinic in the automobile of a friend. He came and sat before me with a worried, anxious face, holding his pulse all during the interview and assuring me

that his heart had been seriously affected by the loss of blood experienced in the extraction of his teeth. I insisted that he go back in the street car, which feat he accomplished, but could not again be persuaded to visit the clinic. A complete collapse was prevented by a novel readjustment. His wife did not want the savings bank account to dwindle so she went out to work and he did the cooking and looked after the house.

Here is a patient in whom one may say that there was a weakness of voluntary control. It was associated, however, with an abnormal anxiety about his physical condition, behind which, considering the final readjustment, there probably lurked a desire to be cared for by his wife.

A normal will would have been able to cope with the conflict. His was able to do so when bolstered up by assurances, and his wife's petting for about three years, only to crumble again and accept a situation in which he became the dependent party and his wife became his supporter and protector.

Such cases as this suggest, at least, that the will is itself weak in some individuals. For this patient did not have a serious conflict as compared with those of other men. Apparently his wife had a strong will. Whether or not this is so, or her weak will was effectively reinforced by the human impulse to save money, it is hard to say. It is likely, however, that a woman who was capable, in the first place, of restraining the very strong feminine tendency to scold a good-for-nothing husband, and then take things in her hands and save the family life by herself going out to work, had a power of will that was as much above normal as her husband's was below.

It is likely, therefore, that strength of will is subject to considerable variations in the many individuals that go to make up the species, *homo sapiens.*

Pathology of Voluntary Action Due to Abnormality of the Intellectual Life.—Voluntary action has not only to do with isolated pieces of action, but also with the management of the individual's whole life. Normal volitional activity means, therefore, a normal life. A life cannot be normal unless it is useful and happy. A life, furthermore, cannot be happy unless it is

useful. We cannot stop to demonstrate the truth of these statements for they would lead us too far outside the sphere of psychology. But if the reader will pause to consider the lives of men he knows in history or in his own experience, he will find that those who accomplish something worth while are happy, and those who waste life are unhappy. The converse in this case is also true, that those who are happy are those who accomplish something worth while.

Life, therefore, must have a goal or an end, that the individual realizes and strives to attain. The end, too, must be worthy of a man. If it is not, pathological disturbances will be sure to make themselves manifest and lead, finally, to shipwreck and failure.

If this is true, an adequate plan of life is necessary for normal volitional activity. Seeing that such a plan of life is often missing, pathological volitional activity is a most common disorder. I may give one example as a representative of a class whose name is legion.

A man of thirty-one came to the clinic at the request of the Red Cross, who reported that he did not work and did not support his wife. The patient himself complained that he was delicate and suffering a general nervous breakdown.

He had spinal meningitis when nine years of age, and some kind of sickness that he termed "walking typhoid," three or four years previous, during which he did not go to bed, but walked about out of his head, and finally cured himself by drinking whiskey and Peruvian bark.

He went only to the fourth grade in school, but claims to have gotten, after that, "a good home education in engineering and chemistry." His mental age was eleven years and six months, with an intelligence quotient of 72.

He married at twenty-two and has three children. His first job was "jumping" on a bread wagon. He was then messenger boy for the Pennsylvania, and later in various telegraph offices, then clerk in the freight division, then call boy for the Pennsylvania Railroad. Then helper in R——'s bakery, then in C——'s bakery, then in W——'s bakery, then in H——'s, then

C——'s again, then G——'s. Then went to North Carolina as a mail clerk. Then took a fish wagon. Then in various bakeries and breweries. He gave up his jobs often because he wanted to move around, often because he would get in a quarrel and "smash" some fellow; but claims that he never acted so they would not take him back. At the time of his examination he was looking forward to being a brakeman on the Pennsylvania Railroad.

In the meantime, his wife complains that he beats her, sits around the house, refuses to go out and work and eats up what she gets by work and charity for herself and the children.

That this man has never conceived of a plan of life there can be no doubt. At the same time, it will be admitted that if he had been capable of such a conception and had held it before his mind it would greatly have reduced his pathological tendency to wander from job to job, and would have made his behavior more normal in every respect.

His life is certainly useless, but in spite of my theory of happiness and usefulness he maintains that he is happy. This claim is probably to be taken with a "grain of salt" or rather we should say, that a man who "smashes" his fellow-workers, beats his wife, and eats up his children's food, does not know what happiness is. He may have a naturally cheerful disposition, but happy he certainly is not. His borderline mentality really spares him the misery that a normal mind would experience that had to look back on a failure such as his.

Unfortunately, there are many normal minds who, having wasted their youth and accomplished nothing, become cynical, sour, discontented, or perhaps sink into a depression as their half century of life draws to a close.

Abnormalities of voluntary action may result from something less fundamental than the absolute lack of any plan or aim or ideal in life. It often happens that people afflicted with some form of mental disorder falsely interpret the behavior of other men, or even animals, or of inanimate objects. They then feel violently impelled to do something about what they think they see, and so result the grossest abnormalities of behavior.

Such false interpretations have their roots in normal mental life. Human nature is prone to be suspicious. To suspect others that may try to circumvent or overreach you is a normal, human impulse, intimately connected with the instinct of self-preservation. To feel sure that you yourself in particular are the object of particular scorn, the one person whom some one individual or a group is persecuting, this is already definitely abnormal. The larger the group to which your suspicion extends the more pathological it is likely to be. You must put it down as a general rule that suspicions are either exaggerated or wholly unfounded.

When a young lady suspects that a gentleman who works at a table near her in the office is continually watching her she is very likely to be mistaken. I remember one case of dementia præcox whose first pathological manifestations came in this way: She suddenly broke out before everyone in the office and told a young man that his behavior was ungentlemanly and unkind, that she would not stand him continually watching her, etc. The young man was really very much surprised and later humbly begged her pardon. The girl afterwards realized that her suspicions were unfounded, felt very much ashamed of herself, resigned her position, and later was taken to an asylum as a well-developed case of dementia præcox.

Faulty interpretations are not always so plausible in their appearance. I remember one young man who came to me because he had heard that I was a psychologist and would probably be able to illuminate him so that he could better understand the complicated action of the minds of other people on his own. I asked him how they acted on him; he said by concentration. "And how do you know they concentrate?" "Why," he says, "it is just this way: As soon as I enter the street car on my way to work, every man in the car holds his newspaper in a particular way, and then I know they are concentrating. Before very long one of them coughs. A cough you know is a call for help from other minds. He feels that my concentration is overpowering him; and then a number of people in the car cough, thereby sending out calls for help, because they see that otherwise I will be too strong for them." The same thing happens at the office.

He is not there long before someone coughs. He felt that this way of persecuting him should cease, and he was going to take the matter up, if necessary, with his congressman.

A lady once complained to me about a fly that used to come and plant itself on the table before her. It would then take its front legs and rub them over its head exactly three times, and then its hind legs and rub them over its wings exactly five times and would then come back and do the same thing over, only the next time the number of rubbings would be different because communicating a different kind of message.

These faulty interpretations lead, at times, to all kinds of misbehavior, violent scenes in public, visits to the White House, murder, etc. The actions committed are in a sense voluntary, but the individuals are not responsible. The locus of their psychic lesion is not in the will but in their thought processes. That a perfectly normal human act may take place, the individual must not only be able to choose, but also to understand. Given the premises of the insane, their actions are perfectly logical, and frequently calculated, rather than the result of blind drives to unspeakable crimes.

Pathology of Voluntary Action Due to Abnormalities of the Affective Life.—Abnormalities of the affective life may be due to the lack or dulness of emotion in situations where a normal human being would be deeply moved, or to the fact that some emotion is present in excess and so interferes with normal behavior.

A girl of seventeen once came to the clinic at the request of a friend. When I asked her what was the matter, she said: (1) That she was indifferent about everything; (2) that she had spells of worry about the ordinary action of her daily life, but never about her sins; (3) that she was restless and never satisfied.

Her mentality was good. She did all of the Stanford fourteen year old tests, all of the sixteen year old, till I came to the digit-span, and then refused to coöperate further. She had been through the second year of high school. She left home about a year previous to her visit to the clinic, and lived with her aunt.

She had been sending thirty dollars a month to her old and dependent father, but now felt that she ought to have the money for herself, and saw no reason why she should be burdened with the "old man's" support. She boasted of her flirtations and declared that she took great delight in "vamping" a man, and then running away and leaving him.

She used to rob the mail boxes in apartment houses just to see what was in the letters. Often, when on a visit, she would steal money or valuables, just to be doing something wicked, feeling sure that her friends would not suspect her. She tried to kill her uncle because he was interfering with her free life. She got some rat poison from a cupboard and put it in his tea. She was afraid he would taste it and so put in too little. When he did not die, but only got sick, she felt very angry.

She says that she has made a league with the devil that if she gets something, she will always do his will. But still she has a hazy idea that she will fool him and end her life as a Magdalen. In fact, she is writing a novel in which the heroine is a prostitute who dies a Magdalen. She claims that she has never felt sorry for any bad act that she has ever done.

I tried to get some information about the extent of her emotional resonance.

Seeing people injured in an auto accident awakened in her curiosity, but no uncomfortable feelings, nor sympathy. She is often cruel to animals, and used to kick the little kittens about at home, just to see them suffer. She is proud that she has not got what she termed " soft, sloppy feelings." She visited the clinic but twice, and then left town. I later received a letter from her from New Orleans, thanking me for trying to help her when she was in Washington.

A case of this kind approaches as closely to the psychiatric phantom, "moral insanity," as anything I have ever met: Normal intelligence and apparently no moral perception. But what we find is not a lack of perception of the difference between right and wrong, but a deficiency of the emotional life. She knows perfectly well that her life is wrong, believes in God, the devil and hell. But there is no emotional resonance in the presence of

human or animal suffering. She lacks a factor in the control of her conduct that is perhaps more potent in maintaining morality than the world in general realizes. What a tremendous change would be wrought in human behavior if, all of a sudden, sympathy and its emotional resonance could be blotted out from our mental life!

This case is very instructive inasmuch as it shows how abnormal behavior may be due, in part, to a lack of inhibitions. This lack of inhibitions was due in its turn to the lack of the emotional resonance of sympathy.

On the other hand, an emotion may be so intense that it will awaken inhibitions that the will is more or less powerless to overcome.

In October, 1920, a man came to me complaining that he did not know what to do with time. He would awaken in the morning and would wonder how he would be able to live through the day. What could he do with the hours before him? He was, at the same time, sad and depressed. He had thoughts of suicide. He got rid of his pistol for fear he would not be able to resist the impulse to kill himself so as to get rid of time. But then he had to fight against the impulse to jump out of the window. He can no longer keep on at his business. If he goes to his office, in spite of the fact that his correspondence is before him, he still does not know what to do with time. If he goes to the moving pictures, he thinks that it will be so many minutes before it is over and feels that he cannot possibly sit through the whole thing. Mere existence seemed interminably slow and he was unable to carry on his former occupation.

His condition was due to a paralytic stroke from which he had practically recovered as far as movement was concerned; but it had worked a complete transformation of his character. His systolic blood pressure was 195.

Here, then, we see a pathological condition due, psychologically, to the slowing down of the stream of thought and a sadness that took the zest out of normal mental activity. Though some improvement was obtained by regulating his diet and administering nitroglycerin, reducing his blood pressure, and enabling him

to attend to some of his correspondence, nevertheless, he remained unable to break through his depression and assume his normal duties.

Excitement, also, may interfere with voluntary action by the acceleration of the stream of thought so that normal insight into conduct, its purpose and its consequences is impaired and the will has not the opportunity to control the patient's behavior.

Anxiety, also, may limit or even destroy responsibility. The following letter indicates a state of mind in which the patient may readily be led to a course of action that will not be reasonable and not in accord with her own best interests:

"I think my trouble was brought about by overfatigue, overanxiety, and apprehension about my brother; not allowing myself to rest in the morning. I think that just as one force can be changed into another, so one anxiety can be changed into another. I feared for him and that fear has been changed into the well-worn groove of another fear, namely, that I should see something sexual. Everything has become something that I must run away from. I don't know how to handle myself at all. I can't look out the window, go into the garden or look at the servant maid. My head is filled with rushing sounds and pulling feelings at my neck, and my spine is in pain, particularly underneath the shoulders, and I ache all over. At night I can't go to sleep with the thought that I will be rested in the morning, because I fear the suffering that the next day will bring, and I notice that my thinking has become confused. Unless something occurs immediately to centre all my attention upon it, I know I shall lose my mind. Two years of freedom from this fear have given me such an increased horror of going through the same thing again, that I am worse than ever. My money is tied up here. My future is a blank. I cannot look to my mother for anything. I have so many physical symptoms that I am going through a complete breakdown. Feel that I should give up my position, sell my home, leave town and go far away where no one will know me."

Pathology of Voluntary Action Due to Abnormality of Impulses and Desires.—When emotional and intellectual life are

normal, I doubt that the will is ever inadequate to the task of controlling impulsive drives and blind desires. At least, I can remember no case in my own experience where excess or defect of impulses and desires is the sole difficulty. Impulses are tendencies to exercise human abilities in the presence of stimuli; desires, cravings to make use of these abilities when the opportunity is lacking. Given normal abilities, there is very likely to be a normal balance between them, and hence, native excess or defect of impulse and desire is not likely to be the sole cause of pathological behavior.

Something akin to a pure conative disorder of will takes place in girls, less often, I believe, in boys, when sexual maturity ripens several years before the normal age of puberty. Healy records a number of these cases and I have had several in the clinic at Providence Hospital. When this happens, the drive of the sex impulse is out of all proportion stronger than the balancing factor of intellectual insight into the meaning of life and its ideals. The will, too, has probably not attained the full strength of adult development. No adequate control, therefore, is possible. It frequently happens, however, that under good custodial care, the balancing factors develop, and develop sufficiently to enable such patients to manage their future life with prudence and success.

In one of my patients I have suspected that the craving to treasure up the good things of this world was so abnormally developed that it was a factor in his pathological behavior.

The patient is a Hebrew, forty-two years of age. He has had several spells of depression. Each one of these had come on when he had gone into business for himself. He commences his enterprises with great enthusiasm and high hopes that he will soon be among the wealthier classes. But after a few weeks becomes anxious and depressed, and finally, incapacitated to carry on his work and sells out at a loss. He then goes back to his trade as a cutter, becomes cheerful again as his wages roll in regularly. Saves money only to be driven on to amass more money by going into business for himself.

The drive to make money is not in itself a unit impulse. But money satisfies many human impulses. This man's craving is so strong that he can never long endure to contemplate the possibility of failure; and so he becomes depressed and tries to save what he can by sacrificing something of what he still possesses. Nor does reason exercise a control over his conduct even in the face of the object lesson of past failure.

Pathology of Voluntary Action Due to Organic Cerebral Defect.—Let us recall again our simile of the ocean liner with its pilot and the mechanism of its steering-gear. The pilot may be perfectly normal and thoroughly acquainted with his business, but if the steering-gear breaks, he will not be able to bring the ship into harbor. So, also in man. The management of human life is dependent not only on normal piloting, but also on the intactness of the mechanism of the steering-gear itself, which, in this case, is the central nervous system. Whatever one may think of this distinction in human psychology between the pilot and the mechanism of the steering-gear, he will have to admit that the psychological disorders of the will that we have just considered are very different from the organic ones we are about to review.

We have already seen that the use of the voluntary muscles depends on the intactness of the nerves going to the muscles and coming away from them. Voluntary movement, therefore, can become impossible because of defects in the peripheral nerves. Broadly speaking, pure nerve injuries pertain to the pathology of voluntary action. Nevertheless, we have been more or less accustomed to looking upon those things that affect the peripheral nervous system as not pertaining to our mental life.

The effects of various toxins that are frequently taken into our system is to impair volitional activity. Thus, alcohol very quickly does away with normal voluntary action. The same is true of morphine. The after-effects of alcoholism on normal volitional activity are by no means so disastrous as are those of morphine. Morphine is said by psychiatrists to paralyze the will. The morphine addict never again becomes a normal man; he is a weakling. And should any difficulty arise, instead of

attempting to put up with it, as most people do, it seems to him unbearable, and he must take to his drug. Just how it is that morphine affects the cerebral mechanism so as to permanently impair voluntary activity, we do not know.

Then there is the condition known as apraxia. All of its forms pertain, ordinarily speaking, to impairments of the will. But what Monakow terms the agnostic form of parapraxia, is a defect of voluntary movement which is due to the inability of certain patients clearly to understand and put together the various elements of a voluntary action. Thus, dressing is a daily performance whose elemental parts must be carried out in a certain order. One of my patients with a brain tumor manifested this form of apraxia, and it was this that first disturbed his wife about his condition. He tried to put his shirt on his legs and seemed to be very much worried because this feat was impossible. Here we have a form of disturbance of voluntary control dependent not on the will, but on correct apprehension. According to Monakow, when it occurs as a permanent mental defect, it is never due to a local injury, but always points to a cortex that has suffered general impairment.

The disease recently recognized and termed *encephalitis lethargica* sometimes leads to abnormalities of behavior. One of my cases manifested a peculiar transformation of personality after the onset of this disease.[4] The patient, prior to his disease, was a quiet, bashful young man, who had never caused any trouble; was a good workman, reliable and trustworthy. After his disease, every symptom of bashfulness disappeared. For instance, in going into the Social Service Department one day he knelt down before the lady in charge and opened his arms and begged her to go with him to the moving pictures. He would walk up to girls in the street and speak to them. He was discharged several times because of his attempts to engage ladies in conversation at the places where he worked. He ruined valuable plumbing materials that were given him to put up—something that he had never done before his illness. He seemed

[4] This case is reported by Donald McNeil in *American Journal of Psychology*, January, 1923.

abnormally cheerful. He was thoroughly satisfied with himself. He addressed a public audience without any show of fear whatsoever. His behavior, in short, was completely different from what it had been before. *Encephalitis lethargica* is a disease which affects the gray matter of the brain, and sometimes of the spinal cord. It is, therefore, certain that this peculiar transformation of character was preceded by injury to the cerebral mechanism. His abnormalities of conduct, therefore, were due to an impaired cerebral mechanism. McNeil thus summarizes the changes that appeared and attempts to reduce them to one unit explanation of loss of control.

"Although many character traits have been noticed as having undergone transformation, it is not impossible that all of these may be reduced to one and the same factor, *i.e.*, a paralysis of inhibitions. This paralysis of inhibitions was due, to a great extent, to the loss of intellectual insights into relations. He is not tactful because he does not see the relation of his conduct to ends that would be more readily perceived by a normal individual; he is forward and bold because he has lost due appreciation of the meaning of conduct. Those things that have been built up by education, that act as a restraining influence upon conduct, have been paralyzed. His behavior resembles very much that of a man slightly under the influence of alcohol. He is clumsy with his tools; he is awkward in his manner; he is talkative; he is cheerful; he has lost all feeling of shame and restraint; he comes late for his job, and has no appreciation of what this may mean; he does not care; he has no bashfulness; he has none of the finer sensibilities. The loss of all of these things and the appearance of others does not mean that his *encephalitis lethargica* has produced a change in many attributes of character, but only in one, *i.e.*, control. This control demands for its perfect exercise the perfect functioning of a very elaborate cerebral mechanism. It is this cerebral mechanism that has been injured by the *encephalitis lethargica*, and because of its injury this peculiar transformation of character has taken place. Such an injury may happen in other ways, and frequently does appear as a transitory disturbance in alcoholism and epilepsy. Unfor-

tunately, with *encephalitis lethargica* the injury is permanent. It is not likely that this patient's character will ever again return to what it was before his sickness."

Volitional Training.—Most works that have to do with volitional training merely give general advice which could be imparted by any honorable man with a fair insight into the problems of life. Thus, Payot, in his little book on the *Education of the Will,* accentuates the necessity of avoiding day-dreaming and sensuality and companions who have ceased to make any effort to improve themselves; not to allow one's self to be captivated by the sophisms of the indolent, *e.g.,* "that it is impossible to do any real work," etc. A suggestive article by Wittig,[5] on the basis of his experience as a teacher, suggests such things as the following: Encouraging a child to speak aloud and not to whisper in asking questions. Use every opportunity to encourage a pupil by saying such things as, "See, you can do it, can't you?" Arouse disgust for dirtiness and associate impurity with uncleanliness. Encourage a child to read a book of instruction with no stories in it, all the way through. Ask the children to see who can keep a piece of candy the longest without eating it. When out on a walk with the children on a hot day, and you pass a stream, ask who can walk on without drinking. In class, ask them who can keep from turning around whenever the door opens, etc., etc. One can readily see that in such exercises as Wittig says, the personality of the teacher is the main thing.

Barrett[6] has attempted to develop a technique of training the will itself by a system of exercises. He assumes that the will is a definite mental faculty, and concludes that if the will itself is to be strengthened, the exercises must be purely will exercises and have no intellectual or other value of any kind, but affect the will and the will alone. Thus, for instance, the student is to make a resolution like the following: Each day, for the next seven days, I will stand on a chair here in my room for ten consecutive minutes, and I will try to do so contentedly. In carrying

[5] Wittig, K., "Willensübungen," *Ztsch. f. d. Behandlung Schwachsinniger,* 1916, XXXVI, pp. 3–19.

[6] E. Boyd Barrett, S. J., *Strength of Will.*

out these exercises the student is urged to make careful introspection of what goes on in his mind during the exercises, to try to pick out his will, as it were, in action and to study it. The following exercises for the curing of an impetus will give a good idea of the method:

1. To replace in a box, very slowly and deliberately, one hundred matches or bits of paper.
2. To write out, very slowly and carefully, fifty times the words, "I will train my will."
3. To turn over, slowly and quietly, all the leaves of a book (about 200 pages).
4. To stand for five minutes in as complete a condition of listlessness and lethargy as possible.
5. To swing the arms over the head slowly and deliberately for five minutes.
6. To watch the movement of the second hand of a clock or watch, and to pronounce some word slowly at the completion of each minute.
7. To draw on a piece of paper, very slowly and painstakingly, parallel lines for five minutes.
8. To count aloud, slowly, up to two hundred.
9. To put on and take off a pair of gloves (or brush a hat) very slowly and deliberately for five minutes.
10. To move a chair from one side of the room to the other, very slowly, for five minutes.

I have not been sufficiently impressed with the method, or perhaps have not had the courage to give it a personal trial. I have, nevertheless, recommended it to several of my patients who felt that their wills were weak, and they have reported that they thought it helped them. I have been rather sceptical, primarily, because of the impression that in most individuals there is plenty of will energy, if there is anything to call it out. I have so often seen the apparently hopelessly languid awakened to new life and activity that I am inclined to believe that most human beings are equipped with will power essentially sufficient for the burdens placed upon it.

Abnormalities of the will, in my experience, are more fre-

quently due to other factors in the volitional complex than the power of will itself—to the lack of high ideals, to faulty interpretations, to disorders of the emotional life, etc. It is not likely that one will correct his ideals or his wrong points of view by standing on a chair for ten minutes every day. If, however, the difficulty with the individual is a pure lack of volitional strength, it is quite possible that Father Barrett's exercises will be of real assistance to him.

On the basis of our analysis of the pathology of the will, we would suggest that volitional training could be attempted along the following lines: For the strengthening of the will itself, there should be exercises in the keeping of resolutions for definite periods of time; to do without something that one craves, such as tobacco, candy, etc.; to rise promptly every morning at a certain hour, etc. Such exercises have to do with real volitional problems and would probably be more effective than those suggested by Father Barrett, although his exercises might be a useful adjunct. Secondly, the development of a high, noble unit plan of life. This is by far the most important thing in volitional activity. It is the intellectual basis of the normal management of our whole life. One who has no plan of life, nothing that he wishes to accomplish, cannot hope to manage himself with ordinary prudence. It is here that religion enters and becomes a most powerful factor in the actual training of the will. Besides one's general plan of life, he must have ideals and principles, a lofty conception of the virtues, truth, honesty, purity, etc.; principles of conduct, such, for instance, as Kant gives in his *Categorical Imperative:* Act always so that you will treat the personality of another always as an end and never as a means. There must be, also, an æsthetic appreciation of the beauty and the value of the moral life. One must develop the habit of looking at things from various points of view and beware of the fallacies that lead to false interpretation of the acts of others and abnormal conduct upon one's own part, based upon such false interpretations.

For the control of the emotional disorders of the will, prophylaxis is the only hope. This prophylaxis means a knowledge of one's self, of one's own complexes, of the pathological associa-

tions that he has developed, so that he can see, on many occasions, the unreasonableness of his emotional outbursts, and so be enabled, by the perception of his own folly, to avoid its consequences. Impulses are ineradicable, and it is vain for us to attempt to dominate them by uprooting them; but they can be balanced by other impulses. The great trouble with many people is the narrowness of their mental life. They know nothing but the pleasures of the senses. They have never allowed opportunity for the development of intellectual drives or æsthetic appreciations. Few normal individuals, perhaps none at all, are incapable of any form of intellectual pursuit or artistic expression. There is so much that is capable of captivating the human mind, that is high and noble and worthy, that it is not necessary for anyone to give himself up to any single impulsive drive. There are many things that can be done by the skilful and for which it is very difficult to lay down hard and fast rules. Volitional control is one of these. It will scarcely be possible ever to do more than analyze the psychological elements in voluntary action and then leave it to the ingenuity of the individual, aided by his psychological insight, to manage the affairs of his own life with tact and prudence. This does not mean that knowledge is virtue. Voluntary power is something real in our mental life, but it cannot be exercised without intellectual insight. The study of the pathology of the will and the mechanisms of the mind is of distinctive value in supplying the depth of insight which is necessary for adequate volitional control.

Volitional Tests.—June E. Downey,[7] Professor of Psychology at the University of Wyoming, has attempted a scale for the measurement of volitional types. The scale purports to measure such characteristics as coördination of impulses, accuracy, tenacity, resistance, assurance, motor impulsion, speed of decision, flexibility, freedom from inertia, speed of movement, by giving the subject a mark for each of these characteristics, and erecting ordinates whose length corresponds with the score in each trait. Then by drawing a line across the top of these ordinates, one

[7] *University of Wyoming Bulletin*, Vol. 16, November, 1919, No. 4-B, Department of Psychology, No. 3, second edition.

obtains the individual's will profile. Miss Downey found that judges who know an individual can readily identify his profile in the midst of a group of other profiles.[8]

It is quite likely that the will profile tests measure something. It is very difficult, however, to say just what they do measure or what is their value once the will profile has been obtained. It is, however, an encouraging commencement, and it is to be hoped that some day psychology may have a test of volitional ability.[9]

[8] "Some Volitional Patterns Revealed by Will Profiles," *Journal of Experimental Psychology*, 1920, III, pp. 280-301.

[9] An attempt by Norman C. Meier (*Journal of Educational Psychology*, 1923, XIV, pp. 385–395) to enquire into the validity and utility of the Downey tests resulted in an unfavorable verdict.

CHAPTER VII

FREEDOM OF THE WILL

Necessitas autem finis non repugnat voluntati, quando ad finem non potest pervenire nisi uno modo. Sicut ex voluntate transeundi mare sit necessitas in voluntate, ut velit navem. Similiter etiam nec necessitas naturalis repugnat voluntati, quinimmo necesse est quod sicut intellectus ex necessitate inhæret primis principiis, ita voluntas ex necessitate inhærent ultimo fini, qui est beatitudo.

St. Thomas, *Summa Theologica*, I. Q. LXXXII, art. i, corpus.

Freedom is the ability to conceive of an end of action, and will the means by which it may be attained. Therefore, no being can be free in this sense of the word unless he is capable of the perception of an end and of the relation of the means to the end that is perceived. We may also say that, given the insight into means and end, if a creature can will at all, its will is, and must be, free. Intelligence, therefore, which is the perception of relations, is the foundation and the guarantee of freedom. Perfect indifference to one end rather than another does not constitute freedom. The possession of freedom does not exclude all necessity in voluntary choice. In fact, all human beings by necessity, seek their own happiness. We are not free to will or not to will our own happiness. Willing our happiness is forced upon us by nature. What constitutes happiness, however, is by no means perfectly clear. All sorts of things are apparently conducive to happiness. Wherefore, while necessitated by nature to seek to be happy, we are not necessitated by nature to seek happiness in any one way rather than another. Freedom, therefore, consists not in choosing to be happy, but in choosing the means that make us happy. One might think that this reduces freedom to a mere question of understanding, and does away with the will altogether. This is not so. For, as a matter of fact, in the actual pursuit of happiness, we are not confronted by a purely intellectual problem. Seeking happiness involves the management of desires and impulses driving to contrary ends. Happiness has so many forms, and human beings have so many desires, that

to know happiness and to seek it involves not only the power to understand ends and the relation of means to ends but the ability to drive the steeds in the chariot of human nature.

St. Thomas Aquinas makes a comparison between axiomatic truths and plans of action. The intellect cannot refuse its assent to first principles, such as the whole is greater than any of its parts. Such truths necessitate the assent of the mind. If, however, one attempts to lay down axiomatic truths and deduces one principle after another from them, as Spinoza did in his system of philosophy, one very soon comes to statements which no longer necessitate the assent of the mind, for their necessary connection with the first principles is no longer irresistibly evident. In the same way there are certain courses of action which are evidently essential to happiness. Whenever this is so, the will chooses them by necessity, but may, nevertheless, be said to be truly free in the choosing. Thus, if a man, who earnestly desires to live longer and do something in this world, were in a burning building, and an escape was open by one door but by no other, he would voluntarily, but also necessarily, choose to escape by that one door. In leaving by the door he would not be forced by any exterior power, his muscles would not be set in motion as they might be in a reflex action, but by the perception of the one means of escape which he would voluntarily choose. The end of human life should be the development of the will and intellect so that truth and goodness are so interwoven that the good is voluntarily chosen by necessity.

In discussing the problem of freedom, the necessity which overhangs human life and activity has been considered from various points of view in different stages of mental development. Let us consider the various ways in which voluntary action might possibly be subject to one form of necessity or another.

1. Can a human being's actions, or at any rate the general course of his life, be determined by forces outside of himself? The prephilosophic speculations, as found in the writings of the Greek poets, answer the question in the affirmative. Man's life and sometimes his very actions were attributed to the indelible decrees of fate. Œdipus killed his father and married his

mother, not in virtue of a voluntary choice, but because the fates had so decreed and it could not be otherwise. Nevertheless, one will find expressions in which even at this very early period the responsibility of human beings for their own acts is recognized. Thus, Zeus says in the *Odyssey:* "Alas, how the mortals accuse the gods! They say that their evils come from us, when they themselves, by their own folly in violating destiny, bring misfortune upon themselves."

In modern times, the problem of the determination of human action by forces exterior to the individual has been transferred from the decrees of the fates to the fortunes and misfortunes of heredity. We may, therefore, ask ourselves: Does heredity determine individual conduct? So far as we can see, heredity never determines any specific thought or action. No thoughts or actions are in themselves inherited. Heredity does not even determine specific diseases, such as tuberculosis, but, according to the best authorities, it may determine a constitution which will more easily succumb to a tubercular infection than another. There is considerable evidence to show that heredity may determine types of character, but there is no evidence to show that the acts themselves of human beings are predetermined by a fatal heredity. We may say that the type of burden that a human being must bear, and to some extent its weight, is settled by his heredity. How far he shall bear it, the way in which he shall bear it, and what will happen to him on the way—these things are not determined by heredity, but by his own management of himself and the accidents of environment.

2. Are human beings subjected, by necessity, to forces inherent in their own nature? Socrates was the first to attempt to answer this question. He turned the attention of men away from the decrees of the fates to the forces that were resident within themselves. He was the first to become interested in moral problems, the first to develop an ethical system, and therefore, he gave considerable attention to the inner life of man. He perceived, just as St. Thomas did, the importance of understanding in voluntary action. He maintained that there is a final cause of every intelligent action, an end, that is, towards which it tends.

Some things are conceived of as good in themselves, others as useful to man. So far he and St. Thomas are in agreement. He raises the question, however, whether or not a man is bound to do what he perceives as merely better than something else. Must a man always choose what he thinks is better? Socrates says yes. It is here that he differs from the Thomistic view, which maintains that the human will is necessitated only by what it perceives as absolutely and in all respects essential to happiness. Socrates pointed out that by intellectual training a man must attain to freedom. With him it was merely a question of knowledge. The virtue of temperance for Socrates does not exist. Everything is prudence, and knowledge determines action. Experience, however, shows that those who can give advice are not always able to follow it, and that those who understand the wisdom of the advice that is given are not always able to take it. Knowledge does not determine. There are forces within our nature that place limits upon the ease with which we follow a line of action that the intellect dictates as the best.

I once attempted to see whether or not the expectation of pain interfered with voluntary action, and contrived the following experiment: Subjects were asked to react with the quickest possible movement on hearing the rap of a little hammer on an anvil. The movement was an outward rotation of the humerus with the forearm resting on a lever. As soon as the arm started to move, it sent a very painful shock from an induction coil through the leg of the subject. As soon as the subject completed an angle of 20° he turned off the current and thereby caused the pain of the stimulus to cease. The stimulus to react did not cause the shock, but the first movement produced the shock. This was explained to the subject and he was told that the quicker the movement the shorter the pain. Did the expectation of pain slow the reaction time? Did the idea that the quicker the movement the less the pain have a tendency to make the subject move with greater velocity through the given angle? The following results were obtained:

In the accompanying table, No. refers to the number of experiments; R. Time, to the reaction time in five hundredths of

	Painful					Painless						
Subject	No.	R. Time	M. V.	M. Time	M. V.	No.	R. Time	M.V.	M.Time	M. V.	R.D.	M. D.
Swift	14	87.6	7.3	72.2	13.0	8	79.06	7.4	52.1	5.02		
	16	87.6	10.5	64.8	7.2	15	75.4	8.0	48.7	2.9		
	12	91.8	10.9	59.9	7.4	10	85.5	8.4	45.2	2.9		
	11	105.1	26.8	69.6	10.2							
Series average		93.02		66.6			80.0		48.7		+13.02	+17.9
Devery	20	100.5	15.2	70.8	10.8	18	94.9	13.0	54.8	5.1		
	19	93.2	11.4	74.7	9.5	19	88.0	13.0	61.1	5.6		
	18	85.7	21.4	85.5	15.1	20	87.2	9.6	62.8	4.4		
	14	86.8	18.3	94.7	12.4	15	72.1	7.9	62.6	5.4		
						11	64.7	6.0	49.0	1.8		
Series average		91.5		81.4			81.4		58.1		+10.1	+23.3
Carey	10	75.2	9.9	53.5	1.6	9	72.0	9.6	57.3	1.7		
	13	107.4	20.6	47.3	2.0	14	82.1	15.3	48.4	1.1		
Series average		91.3		50.4			77.05		52.8		+14.2	−2.4
Burke	17	77.5	15.3	72.2	6.6	11	68.7	18.6	58.9	5.0		
	10	72.7	17.8	67.9	7.4	10	59.5	12.0	73.4	7.6		
	20	51.2	5.2	55.2	2.1	18	50.9	6.2	56.3	2.7		
Series average		67.1		65.1			59.7		62.9		+7.4	+2.2
McGrath	14	73.1	12.2	57.5	1.5	16	55.9	5.1	65.0	2.7	+17.2	−7.5
Dineen	14	115.3	20.0	48.7	3.1	15	74.2	5.8	46.1	1.6		
	13	114.5	18.6	64.6	5.9	11	90.3	12.8	58.1	9.6		
Series average		114.9		56.7			82.2		52.1		+32.7	+4.6
T. V. Moore	7	106.6	25.3	54.1	3.1	7	75.2	13.6	52.3	1.6	+31.4	+1.8

a second; M. V., to the mean variation; M. Time, to the movement time; R. D., to the difference between the reaction time followed by the painful stimulus and the reaction time which was unaccompanied by a painful stimulus; M. D., to the difference between the movement time accompanied by a painful stimulus and the movement time without any painful stimulus. The series were taken on different days, but always paired series painful and painless on the same day, but in different orders on different days. The reaction times and the movement times were both recorded by a tuning fork vibrating five hundred times a second. The subjects were untrained in psychological experiment, with but one exception.

From the averages given, we may conclude that there is a very definite tendency for the expectation of a painful stimulus to retard the movement of reaction by which the painful stimulus is inflicted. The expectation of the pain so paralyzes the motor mechanism in some subjects that they are unable to make the subsequent movement as rapidly as under normal conditions, even though they know that the quicker they make the movement the shorter will be the duration of the pain. This was the case, however, with only two of the seven subjects. The remaining five showed no marked difference in the movement time under the two conditions. Whether or not this represents individual differences in voluntary control or sensibility to the faradic current cannot be determined from the present experiment.

What would happen to voluntary control if the expected pain were much greater and the effects more lasting than in our experiments? We can readily conceive such a condition as would seriously interfere with voluntary control. Perhaps, under certain conditions of fear, responsibility in some persons would be done away with. But between this extreme condition and the simple ones in our experiments there is a considerable field in which pain, though it may retard voluntary action, does not render it impossible or take away responsibility entirely. Our experiments seem also to indicate that there is a difference in the power of different individuals to overcome by voluntary effort the inhibitory effects of fear, though we cannot rule out

entirely the possibility that the observed differences were due in our experiments to differences in the sensibility of the skin.

It is interesting to note that subjects who manifested a marked difference in their reaction time under the two conditions were often entirely unconscious of any influence of the painful expectation.

It is clear, from ordinary experience and introspections, that the pleasant and the disagreeable facilitate and inhibit voluntary action. But it is not clear from ordinary experience that pleasure and pain are the only factors in human action, or that voluntary acts are absolutely determined by emotional factors and impulsive drives.

3. We may, therefore, ask the question: Is man, in any of his actions, ever truly the lord and master of his own will so that he is accountable for choosing one of the many roads to happiness rather than another? Here is the real crux of the problem of freedom. The question is one of fact and should not be determined by metaphysical assumptions about the constitution of the world in general and human nature in particular. Leaving aside, therefore, all theory for the moment, let us consider the following facts:

(a) Every man believes in his own responsibility. If a man by his own laziness and negligence should lose his position and his family come to want, he would not attribute their misfortune to the machinery of the cosmos, but would hold himself responsible for what had happened independent of any theory about the ultimate constitution of things. Every man believes in his own responsibility in regard to some things in his life, no matter what his metaphysical assumptions may be.

(b) Every man holds other beings responsible for their actions. Law is built upon this belief in responsibility. If anybody injures you or those who are dear to you, you do not attribute the injury to the mechanism of the cosmos and let it go at that; you hold him responsible for what he has done.

(c) Every man believes in the power of his own initiative. If anyone wants a position he does not wait for the mechanism of the cosmos to pick him up and place him in the position that he seeks. He bestirs himself, and he believes that if he is active

and tries hard, he has a better chance of getting a position than if he leaves everything to the hidden forces of nature. Experience demonstrates that idleness leads to nothing, and action brings success, and everyone is convinced in practical life of the value of personal initiative.

If these things are so, if we live and act upon these principles, then we should be honest and believe in what they imply. Responsibility for action and the power of initiative imply freedom. No machine has any power of initiative. No machine is responsible. We are convinced, by practical experience, of our personal responsibility and the power of initiative. We should, therefore, be willing to admit everything that this implies. The implication is freedom. We may not be able to explain it. We may not be able to understand why. But this does not rule out the fact. We cannot explain gravity, but we do not doubt it. Why, therefore, should we doubt freedom because we cannot explain it? Doubt about our freedom comes not from facts, not from experience, but from metaphysics.

One metaphysical ground which leads many to deny the plain fact of freedom is the mechanistic view of the world. Nothing exists, according to this view, except matter and material energy. Everything is subject to the push and pull of mechanical forces. Energy in the last analysis is nothing more or less than that which moves a mass with a given velocity. If, therefore, there is nothing in the world but energy and matter, naturally there can be no freedom. The great physical chemist, Ostwald, in 1894, pointed out certain considerations which he thought made it impossible to apply the mechanical theory of energy to organic life and particularly the mental life of man.[1]

As the physicist, Hertz, has pointed out, an essential characteristic of the system of mechanical forces is their reversibility. One needs but to change the sign of velocity from plus to minus, wherever it may appear in the equations, and velocity is reversed

[1] Ostwald, W., *Chemische Theorie der Willensfreiheit. Berichte über den Verhandlungen der Königlich sächsischen Gesellschaft der Wissenschaften zu Leipzig*, XLIV, 1894, pp. 334-343.

Jakob Hacks developed the same line of thought more fully in the *Archiv für systematische Philosophie*, 1899, V, pp. 202–214.

and everything moves in opposite directions. Thus, if the velocity of the earth were suddenly changed, the sun instead of setting would go back to its position at dawn. As far as we can see, in mechanical things, it makes very little difference whether they move in one direction or the reverse. But Ostwald points out that it is characteristic of vital operations that they are not reversible. For some reason it is impossible that an oak should reverse the velocity of its molecules and return again to the condition of an acorn. Such things may be represented to us in the moving pictures by reversing the order of their presentation but involve, in reality, physical impossibilities. However that may be, it certainly makes an essential difference whether mental operations proceed in one way rather than another. If one listens to a speech, it is perfectly capable of being understood as delivered. If, however, the velocity of the movements of the speaker's voice were to be reversed and the sounds should come to the hearer in reversed order, and his mental operations proceed from the end of the speech to the beginning, it certainly would make a much more profound difference than if the sun were to rise in the west and set in the east. Ostwald goes as far as to say:

"In terrestrial phenomena, on the contrary, non-reversibility is not only the rule, but is in every individual case so clearly present that its proof offers no difficulties. And, conversely, special care must be observed whenever we have the problem of arranging almost reversible phenomena. In the face of such facts the mechanical hypothesis fails completely. It is precisely the characteristic peculiarity of actual events, their non-reversibility, that finds in pure mechanical phenomena no expression, and from that one can conclude with certainty that natural phenomena absolutely cannot be reversible."

At all events, such considerations as these should make one hesitate to blindly accept a mechanical view of the world which besides being doubtful from the scientific point of view cannot explain the facts of our mental life.

Ostwald, in the same article, suggests an answer to a difficulty which has been frequently urged against the freedom of the will. The difficulty may be expressed as follows: The sum total of energy is a constant. No energy is ever created and none

is ever destroyed by any processes whatsoever that are known to men. The law of energy holds not only in the physical world, but also in organic life. The energy of the food that a man consumes can be balanced with the amount of work that he performs. There is no place for the introduction of any energy into the cycle of events. If now, the will of man is free, and is going to influence the transformations of energy in the human organism, it is hard to see how this can be done without an infraction of the law of the conservation of energy. The will impulse, in order to change the parallelogram of forces, must itself enter as a force and cause a deviation in one way or another. It must either add to or subtract from the energy of the psychical forces involved. To do this would be against the law of the conservation of energy. There is, therefore, no place for the action of the will.

James suggested, in answer to the difficulty, that a great change might be effected in the action of the organism by the nervous discharge of a single cell, just as at the watershed an infinitesimal force might determine whether a drop of water flows into the Atlantic or Pacific. Such a trivial addition to the energy of the universe is not excluded by any experiments that have hitherto been made.

Ostwald suggests another answer. He points out that catalyzers accelerate chemical reactions without themselves entering into these reactions. Thus, a change is worked in the play of physical energy which may be most remarkable and yet there is no apparent expenditure of physical energy to produce the change. If, therefore, says Ostwald, man had a means of influencing the catalytical activities that transpire in the chemical phenomena that are associated with the mental, then he would have the possibility of accelerating or retarding these phenomena according to circumstances. The action, therefore, of the will would be no more a violation of the law of conservation of energy than is the action of the catalyzers. Whatever may be said about this view, at least it shows that there need be no fundamental contradiction between the law of the conservation of energy and the fact of the freedom of the will.

CONCLUSION

THE SOUL

THE CONCEPT of the soul is in ill repute, not only in physiology and in biology, but also in psychology itself, which, by name, professes to be the science of the soul. This ill repute is so marked and so general that it is worth while, at the outset, to inquire into its origin. It may be traced to several factors.

1. Descartes, who may be looked upon as the founder of modern philosophy, made the soul a spiritual thing that had no common qualities whatsoever with material substances. He gave it a definite location, suggesting that it might be in the pineal gland in the brain. This evidently is a wholly impossible concept. It likens the human organism to a machine. There are a series of cogwheels that represent the afferent circuit of impulses that come to the brain. There is another series of cogwheels that represent the efferent circuit that proceeds from the brain to the muscles, and the two series of cogwheels are connected by a spiritual cogwheel with no likeness whatsoever to anything material. From Descartes' day until the present, no one has been able to see how such a machine could be maintained in action. This idea of the soul was foisted on modern philosophy by Descartes and has become more or less the popular concept in the minds of the people. Its impossibility leads naturally to its rejection, and so, from the Cartesian philosophy comes one reason why the soul concept is in disfavor. One may point out that the soul is incapable of localization. But one cannot look upon it merely on this account as an impossible chimera.

In scholastic philosophy, not only was there no attempt made to localize the soul, but it was conceived of as existing everywhere in the body. This idea of the ubiquity of the soul in the body seems, at first sight, strange and impossible, and, nevertheless, it has its analogy in physical science, and no one regards the

analogy as strange and impossible. Gravity is a force by means of which every particle of matter is said to attract every other particle of matter in inverse proportion to the square of the difference between them. Where is gravity? No one has ever attempted to localize gravity in any one of the planets. It is everywhere and anywhere. We recognize its existence and yet we do not know what it is nor how it produces its effect in the organization of the heavenly bodies into a system. What gravity is to the universe, the soul is to the human body. Conceived of in this way, there is no inherent contradiction in the soul concept, and the prejudice which is due to Descartes' concept, lacks all foundation.

2. Van Helmont (1577-1644), the first chemical physiologist, attempted to explain certain physiological processes by the activity of a number of special spiritual forces, each one of which had a particular function to perform. He thought that in man there are a number of such forces, a hierarchy of powers, supreme among which was the rational soul. He invented two terms, one of which to-day we can count a part of our language, but the other, along with his soul concept, has fallen into disuse. The term "gas" comes from him, a fanciful word which he coined to signify the product of fermentation. In like manner, he formulated the word "blas" to designate those spiritual forces that were supposed to perform physiological functions. Physiology rightly rejected the concept of the "blas" performing the function of hydrochloric acid and pepsin in gastric digestion. Not only was every such concept rejected, but suspicion was transferred from the "blas" of van Helmont to every concept of spiritual power whatsoever that might be conceived of in the human organism.

3. Another source of prejudice against the concept of the soul is to be found in the result of metaphysical speculation in the first half of the nineteenth century. Philosophy, receiving a new impulse from the Kantian theory of knowledge, passed on from epistemology to cosmology and attempted to develop a purely metaphysical explanation of nature. German philosophy attempted to follow the whole course of nature by analyzing the

concept of being. It ran its course, however, and accomplished nothing in the world of physics. In the meantime, experimental science made vast strides in its own field by empirical methods. The comparison between the bankruptcy of philosophy that resulted from the wild speculations of German idealism and the solid and permanent successes of physical science, could not escape the observation of every man of thought. This resulted in a prejudice against all forms of philosophic speculation, a prejudice natural, but illogical. Philosophy became bankrupt by extending its speculations outside the field of its own investigation. This led to prejudice against its concepts. The concept of the soul, therefore, fell into disrepute because it was a philosophic concept, not because any arguments were adduced to demonstrate its insufficiency.

4. The trend of thought which culminated in experimental psychology centred its interests in the states of mind themselves, above all, sensations and emotions. Psychology was accordingly defined as the science of mental processes, and psychologists studied states of mind and paid no further attention to the philosophical problem of the soul. Very soon it was said that psychology had gotten rid of the idea of the soul. And so it did, not by destructive criticism, but simply by neglect.

From this survey of the history of the concept of the soul, the reason for prejudice is evident. The modern scientific mind fears lest metaphysics should supplant physics, and hence has resulted what might well be termed a psychophobia. It is time, however, to return to this neglected problem of the soul, discuss it on its merits and see whether or not the soul can have a place in the philosophy of the mind without encroaching upon the grounds of empirical science.

How was it, we may ask, that man arrived at the concept of the soul in the first instance? It is very likely that primitive man's argument for the existence of the soul was based upon the profound difference that exists between life and death. The dead body seems to lack something which the living body possesses; something apparently is not acting which was acting before. The chemical reaction of the tissue changes. The body digests

itself in its own ferments. It no longer resists the action of organisms of putrefaction. A profound change has come about which suggests to us, as it did to primitive man, that a principle of coördination has ceased to act. The heart evidently has ceased to beat. But is the circulatory system the sole source of coördination in the human organism, which involves not only physiological but also psychological processes? Primitive man jumped to the idea of the soul to account for the difference between life and death. There is nothing in science to show that this conclusion is impossible. In fact, there are considerations to which the biologist, Driesch, in his *Science and Philosophy of the Organism,* has called our attention, which lead to the conclusion that there must be in the living organism a principle of coördination. Driesch's argument may be outlined as follows:

1. There are certain facts centring around the growth of the organism which cannot be explained without the assumption of a vital principle. First of all, there is the general fact of the growth of every organism from one single fertilized ovum. The ova of the different species differ very little from one another. And, nevertheless, each one grows up and becomes a representative that bears all the many characteristics of its species. What is it that causes this wonderful coördination of growth from the beginning to the end of development?

2. Suppose that you cut off a salamander's foreleg near the shoulder joint. What happens? It regenerates. The stump not only reproduces the upper arm, of which it is a fragment, but also the forearm with its radius and ulna and the hand with its carpus, metacarpus and phalanges.

3. Suppose, after the ovum of a marine organism has divided into two cells, we should shake them apart. What happens? Does each cell develop one half of the organism? No. Each cell develops a complete organism, smaller perhaps than normal, but complete in all its parts. This result may be obtained not only by shaking, but much more easily by precipitating the calcium in the sea water. This acts just as if a cement substance were removed, the cells of the ova divide, but do not remain

together. If now they be removed to normal sea water, each fragment develops a complete embryo and not a part of an embryo.

The question now arises, says Driesch, can these facts be accounted for by any mechanical factors of growth? He divides the possible factors of explanation into external and internal, analyzes them and rules out each in turn.

1. **Internal Factors.**—It has been pointed out that living matter is forced to assume a cellular structure by the same laws of surface tension that we see in activity in the formation of soap bubbles or the production of lather when one gets ready to shave himself in the morning. Thus, it is maintained that cellular structure is due to the phenomenon of surface tension. Cells divide when the size of the cell is such in relation to the surface tension of the fluid of which it is composed that it can no longer exist as a unit, but mechanically divides in two. Granted that organic substance is a fluid, it must certainly follow the laws of fluids. The size of its cells will vary with its viscosity. And so the general law may account for its fundamental character of cellular structure. It is easily seen, however, that what accounts for cellular structure in general does not explain the architecture of the species. It may show why all living organisms are composed of cells. It does not show, however, why the ovum of a starfish does not produce a mushroom, a toad, a lion or a man. Surface tension no more accounts for specific architectural structure than the properties of clay can tell us why in one case bricks are put together to build a barn and in another form a bank, a private dwelling or a church. The same thing may be said of osmotic pressure or the unknown X which causes growth or explains the peculiar phenomena associated with cell division. All organisms grow, how and why we do not know; but over and above what causes growth in general, there must be something else that makes growth specific, leading in any given ovum always to one and the same specific architectonic result.

2. **External Factors.**—There are a number of external factors that are necessary for growth. Without a certain degree of heat, without oxygen, without certain salts for germs that develop in sea water, normal growth cannot take place, or per-

haps is wholly impossible. It is evident, however, that these external factors are necessary conditions in formative causes. They no more explain specific structure than does the fact that a church cannot be built in zero weather when the mortar freezes, tells us why it develops into a Gothic cathedral rather than a Roman basilica.

Driesch then asks whether or not there is any chemical means of directing these general external and internal factors so that they produce a specific structure. Could, for instance, a chemical substance, *e.g.*, a specific protein, determine a structural formation? Something akin to this seems to be the case in crystals, where simple geometric figures are involved. But even here we do not know the ultimate reason why a certain chemical substance always crystallizes into shapes which are definite and characteristic. In the simpler forms of such structures, we can understand why the fitting in of one form into another is determined by the geometric arrangement of its surfaces. But no superposition of geometric elements could explain the structure of any one bone of the human body, much less such an irregular bone as the temporal with its petrous and squamous portions, its zygomatic, styloid, and mastoid processes, to say nothing of the semicircular canals and the small bones of the middle ear. Once growth is in progress, according to definite laws, a chemical substance may retard or accelerate it, thus, producing specific abnormalities as in cretinism and acromegaly. But, actually to determine architectural structure is not the function of any chemical substance. And even though it were so, it would still remain a mystery how and why the stump of the humerus could determine not only its own regeneration, but also the regrowth of entirely different bones, such as the radius, the ulna, the carpus, metacarpus, and phalanges, with all their specific protuberances and cavities and irregularities.

Driesch then asks whether or not some kind of machine located in the germ might be the cause of the product. This was the idea which lay at the root of Weissmann's germinal *Anlagen*. What do we understand by a machine? Driesch defines it as follows:

"A machine is a typical configuration of physical and chemi-

cal constituents by the acting of which a typical effect is attained." Suppose that such a machine exists in the fertilized ovum or in the much more developed gastrula. If now you divide a gastrula in two, the remaining halves do the work of the whole, and two complete organisms result. Or, if you shake the embryo apart in the two, four or eight cell stage, you get two, four or eight organisms. Must you assume that there are as many machines in the ovum as there are possible complete organisms that may be obtained by shaking apart the cells of the embryo? Can you break a machine in two and have the machine reconstruct itself and then reconstruct the organism? Such a possibility makes the assumption of a machine superfluous, and shows that there is something in the ovum of a non-mechanical nature which determines its growth and development. What, says Driesch, is this determining factor? He maintains that one is led by exclusion to conclude that there exists a non-mechanical vital principle. What shall we name it, he says? What it was first named in Greek philosophy by Aristotle, the first to conceive its function in clear terms? Aristotle called it an entelechy. This term was translated in scholastic philosophy as *forma substantialis*, the equivalent of the modern word "soul."[1]

[1] An objection to Driesch's argument for a vital principle might be urged from Morgan's view of the localization of Mendelian determinants in the germ plasm. If one assumed that these determinants are definite chemical substances, one might argue that whatever theory might say about the possibility of a chemical substance determining structure, the fact remained that the chemical substances constituting the Mendelian determinants do determine the structures with which they are related. It is not certain, however, that the Mendelian determinants are definite chemical substances. Even dynamical elements are capable of localization. Furthermore, some Mendelian characteristics are not so much qualitative as they are quantitative. Thus, for instance, long hair or short hair, kinky hair or straight hair, might be due to the quantity of a certain substance in the germ cells that would later be used in developing hair. Thus many Mendelian characteristics could be explained as quantitative and therefore due to some excess or defect of a certain substance in the germ plasm. And whatever might be the explanation of individual characteristics, the assembling of all the parts of an organism and the characteristics which modify these parts into one structural unit is itself a phenomenon of coördination that demands an explanation.

J. V. Uexküll[2] divides the factors in the growth of an organism into archetectonic and mechanical. He recognizes the existence of a number of archetectonic impulses leading to growth and development of the different bodily tissues and organs. These archetectonic impulses may be said to make use of mechanical forces. The development of the embryo is compared by him to a melody progressing by the laws of harmony. But whence the melody? A piano is a mechanism, but it does not compose. The progression of the living melody of the organism is a non-mechanical phenomenon. It is archetectonic, that is, the manifestation of the activity of the non-mechanical principle of this organism, the entelechy or *forma substantialis,* or in plain English the vital principle or soul.

Let us turn now from biological to philosophical considerations. What does philosophy tell us about the soul? The facts of our mental life constitute the realm of our experience. Nothing can be more intimate to us, nor more certain, than the fact of conscious experience itself. The original task of psychology was to account for this conscious experience. Our mental states are phenomena that come and go, actions or activities of some kind or another. What is it that is conscious? What is active when we are aware of any one of the many forms of conscious experience? There are three possibilities to be taken into consideration:

(1) Either the brain thinks, that is, material substance is the substrate of conscious processes;
(2) Or the non-material thinks, that is, the soul thinks;
(3) Or neither the mind nor the soul thinks, but we have conscious processes and these alone.

The latter was the view of Wundt. Let us consider Wundt's view in the first place. It is hard for one who has not grown up in familiarity with German philosophy to understand the position of Wundt. Immanuel Kant maintained that we can never know whether or not there is any such thing as a sub-

[2] *Cf.* J. V. Uexküll, "Technische und mechanische Biologie," *Ergebnisse der Physiologie,* 1922, XX, pp. 129–161.

stance, a *Ding an sich,* or thing in itself that underlies the phenomena of experience. All we know is that we cannot conceive of action without something acting, or accidents without an underlying substance. Then Fichte came along, with a misplaced drive to perfect honesty, and maintained: If we do not know that there is any "thing in itself," let us deny its existence and say that it does not exist—an attitude much less logical than that of Kant. Therefore, Fichte developed his philosophy of action in which there was motion without anything moving; action without anything acting. He himself, however, could not endure such a contradiction and later in life gave up his philosophy of action for the philosophy of being in which substance regained its place in his mind. Such a concept, however, prepared the way for Wundt. Wundt, having studied conscious processes as the object of psychological research, maintained, in analogy with Fichte, that conscious processes themselves constituted the reality of the mind, so that it was neither the brain that thought nor the soul that thought; neither materialism nor spiritualism is right, but instead of that the philosophy of action maintained the primacy and sole existence of the conscious processes themselves. However, this position of Wundt is no more tenable than that of Fichte. We simply cannot conceive of action without anything acting, or motion without anything moving, thought without anything or anybody thinking, sensations without anything or anybody sensing, etc. Given conscious processes, they must be the activities of some underlying substance. This substance is either material or it is spiritual, either the brain or the soul. It is not material. If identities are to be identical, and explanations are to explain, we cannot identify our mental life with chemical reactions or explain consciousness in terms of energy, which is merely that which moves a mass with a given velocity. If one takes the mechanical view of life at its face value, it is nothing but a series of chemical reactions in which molecules, made of atoms, disintegrate one by one and new molecules are formed with the elimination, or by the aid, of heat. Does this view explain how

a chemical reaction can be conscious of itself, or how one chemical reaction can be conscious of another? Suppose that by the invention of a wonderful X-ray microscope we could see the chemical reactions and the shifting of the elements that take place in the retina when a ray of light impinges upon it. Suppose by means of this same instrument we could follow whatever changes take place in the optic nerve and in the various way stations on back to the occipital cortex, and suppose here we could see a number of dancing atoms. Would we be able to identify this dance of atoms with the sensation of red, or would we have first to look and see what kind of light impinged upon the subject's eye in order first to find out what was taking place in his brain? The dancing atoms have no identity whatsoever with, they do not even bear a resemblance to, a sensation. They cannot, therefore, explain even sensation, let alone the higher thought processes and the activity of the will. If, therefore, there must be some substrate of conscious processes, something which is active when the mind is conscious, and if this cannot be a material substance, then there must be a non-material substance, that is to say, a spiritual substance or soul. Philosophy in this way confirms the conclusion of biology.

We may now ask ourselves whether or not this spiritual substance or soul is capable of surviving bodily death. Everything in science goes to show that nothing whatsoever is either added to or taken away from the sum total of that which goes to make up the universe that we know. Man is just as incapable of annihilating as he is of creating. Once a thing is, it does not cease to be except by the same creative power that brought it into existence. We have no reason to suppose that in this respect the immaterial world is any different from the physical. If, therefore, the organism disintegrates, its parts remain in existence. The soul as the principle of coördination, and the stream of conscious life remains also in existence. It can no longer exercise, however, all its powers. There is no organism for it to coördinate. There are no sense organs by means of which it can receive new impressions. If, therefore, its conscious life were wholly dependent

upon the sense organs, though the soul itself would continue to exist, conscious immortality would be immpossible. We have seen, however, in discussing the conceptual theory of voluntary action, that over and above sensations we have also ideals and concepts that have no bodily organ. That being the case, those conscious elements which are not dependent upon the activity of bodily organs do not cease with the disintegration of the organs on which they do not depend. We have no guarantee from philosophy alone that such a continuation of existence would, in any sence of the word, be desirable. Philosophy may show that it is inevitable and eternal. Divine revelation alone can guarantee the happiness of eternal life.

GLOSSARY OF TECHNICAL TERMS

A

Aboral. Belonging to the part of an organism away from the mouth.

Abreaction. Giving free vent to emotional expression.

Accommodation. Adjustment of the eye to near and far vision.

Accommodation, Muscles of. The muscles which control the curvature of the lens and so adapt it to near and far vision.

Accommodation Reflex. Contraction and dilation of the pupil on focussing the eye on a near or far point.

Acromegaly. A disease in which the bones of the hands, feet and face are enlarged, due to oversecretion of a gland in the brain known as the hypophysis or pituitary body.

Adrenalin. A substance secreted by two glands one located close to each kidney (hence termed adrenal glands). As Cannon has shown adrenalin is secreted in violent emotions and produces a series of effects in the organism. See p. 126 ff.

Afferent. A term applied to nerve fibres that lead to the centre. Sensory fibres are afferent. Opposed to efferent, *q.v.*

Agonists. The muscles involved in the execution of a movement. Opposed to antagonists.

Amblyopia. Dulness of vision.

Amnesia. Loss of memory.

Anæsthesia. Loss of sensation.

Angina Pectoris. A disease due to spasmodic constriction of the main arteries of the heart muscle causing violent attacks of pain referred to the region of the chest in front of the heart. Such attacks are frequently brought on by emotional excitement.

Anlagen, Weissmann's Germinal. The supposed loci in the fertilized ovum from which, according to Weissmann, the various parts of the body are developed.

Anode. The positive pole of an electric battery, so called because gases, in electrolysis, ascend (*ἀνά* up) at the anode. But cf. *Science*, LIX, 163.

Antagonists. The muscles opposed to those involved in a movement.

Anterior Roots. Bundles of nerve fibres that come from cells in the anterior horns of gray matter in the spinal cord and go to supply the muscles of the body.

Aorta. The large artery that carries blood away from the heart.

Aphasia. Loss of the ability to speak.

Appetitive. A term used in this work to indicate the group of mental states that may be regarded as reactions of the mind. See schema, p. 50.

Apraxia. Loss of the power to perform previously learned habitual acts, due to an organic injury of the brain.

Architectonic. Having the function of superintendence and control; constructed according to a plan.

Arteriosclerosis. Hardening of the arteries.

Association Fibres of the White Matter. Nerve fibres that run in the white matter of the brain connecting one part or gyrus of the cortex with another.

Asymbolia. Loss of the power to interpret symbols and gestures.

Ataxia. A loss of the power to co-ordinate movement leading to awkwardness with hands or legs.

Atrophy. A wasting of tissue leading to its decrease in size.

Auto-eroticism. Causing sexual satisfaction by self-excitement; fixation of love on one's self to the exclusion of external objects.

B

Bone Conduction. Conduction of sound through the bones of the skull to the inner ear, *e.g.*, when the handle of a vibrating tuning fork is placed somewhere on the head. Increased bone conduction is a sign of middle ear disease.

C

Calcareous. Chalky.

Carcinoma. Cancer.

Cardiac. Pertaining to the heart.

Cardiovascular. Pertaining to the heart and blood vessels.

Carotid Plexus. A network of sympathetic nerves surrounding the internal carotid artery.

Carpus. The eight bones of the wrist.

Categorical Imperative. A phrase used by Kant to designate the fundamental law of morality to do good and avoid evil.

Cathartic Method. The method that attempts to cure a mental condition by discovering some buried emotionally toned memory and opening up the patient's past as a physician opens a boil and lets out the pus.

Catheter. A tube usually used in artificially emptying the bladder; often made of soft rubber and capable of being inserted into a vein.

Cathode. The negative pole of an electric battery, so called because, in electrolysis, metals are thrown down (*κατά*, down) or deposited at the cathode. But cf. *Science*, LIX, 163.

Caudate Nucleus. One of a pair of masses of gray matter in the brain, consisting of a head that tapers to a long recurved tail. The caudate nucleus forms part of the floor of the lateral ventricles. Its function is still under investigation, but among other things it seems to have something to do with the regulation of the body temperature by way of constricting and dilating the blood vessels.

Cell. The unit from which is built up all living tissue. It consists of a cell wall, the cell contents, or protoplasm, and a nucleus.

Central End. The end of a nerve leading to the cord, or the end of a bone nearest the body. Opposed to distal, the end away from the centre or body.

Centripetal. Going to a centre, as centripetal stimuli, *i.e.*, those that go to the cord or brain. Opposed to centrifugal, those that go to a muscle or organ of the body.

Cerebellum. Literally the "little brain." A large ganglionic mass located posteriorly beneath the cerebrum. It has to do with the coördination of movement and equilibrium.

Cerebral. Pertaining to the brain.

Cerebrospinal. Pertaining to the brain and spinal cord, as the cerebrospinal fluid.

Cerebrum. The brain.

Cervical Region. The part of the spinal cord which gives rise to the nerves that supply the neck and arms and is characterized by an enlargement known as the cervical enlargement.

Chiasm, Optic. The place at which the two optic nerves meet and where some of their fibres cross and go to the opposite side of the brain, the remaining fibres continuing to the same side of the brain.

Chloroplasts. Green granules in the cells of plants, otherwise known as chlorophyl bodies.

Chorea. A term used to describe an involuntary jerking of the muscles now in one part of the body, now in another. Often used to designate the disease known as Sydenham's chorea or chorea minor, in which this involuntary jerking is the most characteristic symptom.

Choreiform. Resembling the tremors found in chorea.

Chromosome. One of a number of fragments into which the dark staining matter of the nucleus of a cell breaks up when cell division is about to take place in the process of growth or repair. Each species has a definite number of chromosomes in its body cells, and half that number in its germ cells. The chromosomes are regarded as the bearers of all hereditary traits.

Ciliary Nerves. The nerves that supply the ciliary muscles of the eye, on whose action the curvature of the lens and therefore the focus point of the eye depends.

Circulatory. Pertaining to the circulation or flow of blood in the arteries and veins.

Collaterals. Branches given off from the long axis cylinder process of a nerve cell.

Colliculus. One of four similarly shaped protuberant ganglia in the mid-brain grouped in two pairs, the superior and inferior colliculi (or corpora quadrigemina in the older terminology).

The superior have to do with visual, the inferior with auditory reflexes.

Conative. Characterized by an element of striving. A term used in this work to group together impulse, desire, and instinct as conative mental states.

Concatenated. Chained together.

Cones. Microscopic structures in the retina of the eye which are affected by rays of light giving rise to a stimulus that is transmitted to the brain and perceived as light. The cones are supposed

by some to be concerned with color vision, while the rods (*q.v.*) react only to degrees of brightness.

Corrugator Supercilii. The "wrinkler of the eyebrow," a muscle which draws the eyebrow to the centre, causing an expression of pain or grief when it acts on one side only.

Cortex. Literally bark, that is, an outer covering. A word used to designate the outer covering of gray matter that spreads over the brain.

Cortical Tangential Fibres. Fibres located in the outermost layer of the cerebral cortex running parallel with its surface.

Cosmology. The philosophy of nature.

Cretinism. A disease due to lack of secretion of the thyroid gland.

Crustacean. One of a class of animals, such as the crab, that have a hard shell which they shed periodically.

Curare. A drug, originally used as an arrow poison, which paralyzes all the voluntary muscles of the body by preventing nerve impulses passing through the terminal structures of the nerves in the muscles.

Curarize. To bring under the influence of curare, that is, to render the muscles incapable of being stimulated by stimulating the nerves.

Cutaneous. Pertaining to the skin.

D

Deiters' Nucleus. A group of cells in the upper part of the medulla oblongata (*q.v.*) that receives fibres from the semicircular canals (our end organ of equilibrium) and transmits stimuli (by way of the posterior longitudinal fasciculus) to the body muscles and the centres for eye and head movements. It therefore coördinates eye, head and body in the process of maintaining equilibrium.

Dementia Præcox. A term used by Kraepelin to designate what he regarded as a unit mental disease (with, however, various subforms) characterized by early dementia (that is general disintegration of the mind). The dementia is usually preceded by peculiar bizarre behavior, loss of interest in the outside world, lack of correspondence between intellectual states and their emotional expression, hallucinations and delusions. Kraepelin regarded the disease as a result of disordered function of the sex glands. Others look upon it as wholly or in part due to mental reactions to the difficulties of life.

Dementia Senilis. Mental disintegration coming on as the effect of old age.

Diabetic. Pertaining to the disease known as diabetes in which sugar and starch cannot be properly utilized by the body and so glucose appears in the urine.

Distal. Pertaining to the end (*e.g.*, of a nerve fibre) away from the centre. Opposed to central.

Dynamometer. An instrument for measuring the force of the grip of the hand.

Dyspnœa. Difficulty of breathing.

E

Echolalia. Echo speaking; a pathological condition in which the patient repeats the last few words of everything that is said to him.

Echopraxia. A pathological condition in which the patient imitates every movement that is made before him.

Efferent. Leading away from the centre, as the nerve impulses that go to the muscles.

Embryo. The fertilized ovum in its earlier stages of development.

Embryology. The science of the development of the fertilized ovum.

Emetic. A drug that produces vomiting.

Emotional Resonance. See Resonance, emotional.

Encephalitis. Inflammation of the brain. A word often used at present for "sleeping sickness" or *encephalitis lethargica* in which a comatose condition is often a marked symptom.

Encephalon. The brain.

Encysted. Enclosed in a cyst or outer covering. Some one-celled organisms, as Euglena and amœba, have the power of encysting themselves when the medium in which they live becomes in some way unfavorable and threatens life.

Endocrinopathy. A disorder of the glands of internal secretion.

Endogenous. Produced by factors within the organism.

End Organs. Structures in which the nerve fibres terminate on arriving at their destination and which no doubt have something to do in carrying out the special function of the nerve.

Endothelial. Pertaining to endothelium, *i.e.*, the special type of cellular tissue that lines the body cavities and the interior of the blood vessels.

Entelechy. Aristotle's name for the soul or the principle of life.

Epidermis. The outer layers of skin tissue or the outermost and uppermost layer in the structure of the leaf.

Epilepsy. A disease characterized by periodic convulsive seizures in which the patient is unconscious and in which he often does himself serious injury by falling.

Epileptiform. Resembling the convulsions found in true epilepsy.

Epistemology. A science which deals with the theory of knowledge and its validity.

Ergograph. An instrument for measuring the amount of work done by a group of muscles.

Error, Probable. The amount by which any average obtained by observation, or a ratio such as correlation, may just as likely as not exceed or fall short of the true average or ratio. The probable error is an index of the reliability of an observation. The smaller the probable error the more likely the observed average, or correlation obtained, represents actual conditions.

Etiological. Pertaining to causal factors.

Etiology. The scientific knowledge of the causes of any condition.

Exogenous. Produced by factors outside the organism.

External Geniculate Body. See Geniculate body, external

Extracapsular. Outside the capsule.

F

Facialis. The seventh cranial or facial nerve which supplies all the muscles of expression.

Faradic Current. The current produced by an induction coil.

Fascia Lata. A broad dense layer of connective tissue over the muscles of the thigh, often used in surgery to transplant where a covering of tissue is needed.

Fasciculus. A bundle of fibres.

Fasciculus, Posterior Longitudinal. A bundle of nerve fibres running from the mid-brain to the spinal cord connecting the eye muscles and the inner ear with the muscles of the body.

Femoral Vein. See Vein, femoral.

Fiat. Literally, "Let it be done." A word often used to designate the voluntary act of decision.

Fissure of Sylvius. See Sylvius, fissure of.

Flatus Vocis. The breath of the voice; the spoken name.

Flexibilitas Cerea. A peculiar condition of muscular tonus that maintains the members of the body more or less indefinitely in any position in which they may be placed. The symptom is found in what is known as the catatonic forms of *dementia præcox* and in one of the stages of hypnosis.

Flexion. Bending; opposed to extension, stretching.

Foci of Infection. Places in which infectious material is localized.

Fœtus. The undeveloped, unborn child.

Frontalis. A muscle under the skin of the forehead which produces the transverse folds indicative of surprise.

Functional. A term used to designate an abnormality, *e.g.*, paralysis, deafness, etc., which is not due to a physical injury, but rather to a mental state.

G

Galvanometer. An instrument for detecting the presence of an electric current and measuring its strength by the swing of a suspended needle or mirror.

Ganglia Subcortical. The cerebral ganglia located beneath the cortex as the caudate nucleus, the lenticular nucleus and the thalamus.

Ganglion. (*plural*, Ganglia). A group of nerve cells usually manifesting itself by a slight swelling in the path of a nerve or a protuberance in the brain.

Ganglion, Gasserian. The large extracerebral ganglion in the path of the fifth cranial or trigeminal nerve.

Ganglion, Sympathetic. A group of nerve cells in the sympathetic nervous system. There is a chain of these ganglia on either side of the spinal column.

Gasserian Ganglion. See Ganglion, gasserian.

Gastrointestinal. Pertaining to stomach and intestines.

Gastrula. A stage of development in animal organisms in which the

organism is cup-shaped and consists of two layers of cells.

Geniculate Body. One of four cerebral ganglia grouped in two pairs, external and internal. The external geniculate bodies are subcortical centres for visual reflexes, and the internal for auditory reflexes.

Glossopharyngeal. Pertaining to the ninth cranial nerve which supplies the muscles of the upper part of the pharynx and transmits touch and taste stimuli from the posterior third of the tongue, the fauces and the uvula.

Glycosuria. A condition in which sugar is secreted in the urine.

Golgi, End Organs of. See Neurotendinous end organs.

Gyrus. One of the folds of the cortex of the brain, termed also a convolution.

Gyrus, Postcentral. The cerebral convolution behind the fissure of Rolando in which the pathways of touch sensation have their terminus.

Gyrus, Precentral. The cerebral convolution in front of the fissure of Rolando, stimulation of which leads to definite movements. The motor centre of the brain.

H

Heterosexual. One who is attracted by those of the opposite sex. Used also as an adjective.

Histology. The science that treats of the microscopic structure of the tissues of the body and its various organs.

Homosexual. One who is attracted by those of the same sex. Used also as an adjective.

Horns, Anterior and Posterior. The gray matter of the spinal cord is arranged so that in cross-sections it has something of the figure of an H. The four corners of the H are known as "horns": Two anterior, which contain the motor cells of the muscles of the body; and two posterior whose function is sensory.

Humerus. The bone of the upper arm.

Hydrocephalus. Dilation of the head due to an accumulation of cerebrospinal fluid.

Hypermetropia. Farsightedness, a defect of vision.

Hypertrophy. Overgrowth.

Hysteria. A mental disorder manifesting itself in peculiar seizures often resembling epileptic fits, or in paralyses, deafness, peculiar areas of loss of sensation, but for which disabilities there is no anatomical basis. One can, however, often detect some advantage that a patient reaps out of an hysterical disability.

Hysterical. Pertaining to hysteria; functionally caused and not due to an organic injury.

I

Ideomotor. Pertaining to the theory that all ideas have a tendency to flow over into action.

Infusoria. A class of free swimming unicellular animalcula, so named because found in infusions of decaying animal and vegetable matter.

Inhibit. To block or frustrate.

Inhibition, Retroactive. When another form of mental activity, or another piece of learning by heart, immediately follows the work of memorizing it tends to obliterate the memory trace. The effect of the second piece of work in undoing the results of the first is termed "retroactive inhibition."

Innervate. To supply with nervous stimulation.

Intelligence Quotient. The ratio of one's mental age to his actual or chronological age multiplied by 100. Normal mentality would therefore be 100. An I. Q. below 70 probably means feeblemindedness.

Interstitial. Located in the interstices or spaces of a network, as the interstitial connective tissue that lies between the tissue that performs the special function of one of the organs of the body.

Intracapsular. Located inside the capsule.

Iris. The colored part of the eye, a muscular mechanism that controls the size of the pupil.

Iritis. Inflammation of the iris.

J

Joint Capsule. The membrane covering the ends of the two or more bones that meet at a joint, and which contains a lubricating fluid known as the synovial fluid.

K

Katatonia. A condition of spastic rigidity of the body by which peculiar attitudes are maintained for long periods.

Kinæsthesia. The peculiar form of awareness by which we are conscious of our muscular movements.

Kinetic. Pertaining to movement or energy.

Korsakoff's Complex. A mental disorder resulting from chronic alcoholism characterized particularly by gross disturbance of memory.

L

Lenticular Nucleus. A large mass of gray matter in the brain, separated from the caudate nucleus by the internal capsule. It probably has something to do with the normal execution of movement and is found diseased in cases of pathological trembling as in *paralysis agitans.*

Lesion. A general name for any injury, or locus of infection, or area of degeneration.

Leucocytes. The white corpuscles found in the blood.

Ligaments. Strong bands of connective tissue strengthening the capsules around the joints of bones.

Lumbar Region. The part of the spinal cord which gives rise to the nerves that supply the lower extremities and which manifests an enlargement known as the lumbar enlargement.

Lymph Vessels. Small canals which carry the waste material from the interstices of the tissues and empty it into the veins.

M

Malnutrition. A condition due to improper assimilation of food.

Manic-depressive. Pertaining to the state of manic-depressive insanity, that is, a psychosis characterized by alternating periods of excitement or depression. Individual attacks clear up completely but are always likely to recur.

Matter, Gray. A term used to designate nervous tissue composed extensively of nerve cells.

Matter, White. A term used to designate nerve tissue composed mainly of nerve fibres.

Medulla Oblongata. Part of the hind-brain which passes below into the spinal cord. It contains centres for many important functions, such as respiration, heart action, etc.

Megalomania. Suffering from delusions of grandeur, such as thinking one's self a king, or Napoleon Bonaparte, or immensely wealthy, etc.

Mendelism. The theory of heredity established by the Augustinian Abbot, Mendel, which associates particular characteristics in the offspring with specific determinants in the germ plasm, and enables one, from the characteristics of the parents, to calculate beforehand the ratio in which a character will be present or lacking in the offspring.

Meningitis. Inflammation of the coverings of the brain.

Mental Age. The mental level measured in years and corresponding to the average mentality of children at the year designated, *e.g.*, seven years, ten years, etc.

Mesonephros. The second form of secretory apparatus developed in the embryo.

Metabolism. The chemical processes involved in the building up and breaking down of tissue that constantly goes on in the living organism.

Metacarpus. The five bones between the wrist and the fingers.

Metanephros. The final form of secretory apparatus developed in man.

Metazoa. Animals (in contrast to the protozoa) which are built up of more than one cell.

Muscles of Accommodation. See Accommodation, muscles of.

Muscle Spindles. See neuromuscular end organs.

Myelinization. The process by which nerve fibres are covered with a sheath of myelin, a fatty substance which probably insulates the nerve pathways and so renders them capable of functioning.

Myelitis. Inflammation of the spinal cord.

N

Negativism. A trait which makes a patient take an attitude of opposition towards every suggestion or command that others make. See p. 219.

Nephritic Tubules. A system of tubules functioning as a kidney.

Neurasthenia. A word used to designate a condition of abnormal irritability and tendency to exhaustion. Authorities differ as to whether the condition is due to a "functional disorder of the

nervous system" or is to be regarded as purely psychogenic. To react to difficulties by a show of exhaustion or by exaggerating the signs of fatigue, is, however, sometimes at least an appeal for sympathy, a definite parataxis peculiar to certain characters.

Neurochemistry. The chemistry of the nervous system.

Neurofibrils. The microscopic fibres at the extremities of a nerve.

Neurological. Pertaining to the nervous system or the science which treats thereof.

Neuromuscular. Having muscular and nervous elements.

Neuromuscular End Organs. Microscopic structures in the muscle, most numerous near the tendons, which may be stimulated either by the tension of the muscle or the stimulus itself that causes the muscle to contract. See p. 252.

Neuron. The microscopic unit of the nervous system consisting of a nerve cell with its prolongations: (*a*) The dendrites or tree-like branches of the cell, and (*b*) the long axis cylinder which in the motor cells of the cortex, extends from the brain to the spinal cord.

Neuropathic. Having an abnormal constitution of the nervous system.

Neurosis. A term used properly to designate *physical* disorders for which no anatomical basis can be found, but which could conceivably be due to malfunction of the nervous system *e.g.*, abnormal flushing or pallor of the skin, disordered heart action, etc. It is sometimes used in a broader sense so as to include even *mental* disorders, especially single symptoms that have no apparent basis in an anatomical injury, as in the term "war neuroses."

Neurotendinous End Organs. Microscopic structures in the tendons that are probably stimulated by tension, giving rise, perhaps, to part of the sensory complex of which we are aware in muscular action.

Nevus (or *nævus*). A reddish spot or elevation on the skin, usually congenital, due to dilation of small blood vessels; sometimes used also as synonymous with mole.

Nucleus. A group of nerve cells from which a nerve takes its origin, or which constitutes a ganglionic centre.

Nucleus, Deiters'. A group of cells in the upper part of the medulla oblongata (*q.v.*) that receives fibres from the semicircular canals (our end organ of equilibrium) and transmits stimuli (by way of the posterior longitudinal fasciculus) to the body muscles and the centres for eye and head movements. It, therefore, coördinates eye, head, and body in the process of maintaining equilibrium.

Nucleus, Lenticular. A large mass of gray matter in the brain separated from the caudate nucleus by the internal capsule. It probably has something to do with the normal execution of movement and is found diseased in cases of pathological trembling such as *paralysis agitans.*

Nucleus, Oculomotor. The group of nerve cells from which proceed the fibres of the third cranial nerve which supplies four of the six external muscles of the eyeball.

O

Œdema. Swelling of a part due to inadequate circulation; dropsy.

Ontogenetic. Pertaining to the development of the embryo or the individual.

Operculum. Literally a lid. In brain anatomy, a part of the cortex, covering an indented area known as the Island of Reil.

Optimum. The most favorable condition.

Orbicularis Oculi. A muscle in the skin surrounding the eye slits, which closes them when acting as a unit. When the external portion only of the muscle acts, it produces the "crow's feet" at the corners of the eyes that give the twinkle to a smile. When the superior and interior portions act, they produce an expression of reflection.

Organogenic. Due to physical abnormalities in the organism.

Osmosis. The process by which fluid passes through an intact membrane from a less concentrated to a more concentrated solution.

Osmotic Pressure. The pressure developed within a membranous capsule due to osmosis (*q.v.*).

Otoliths. Chalky granules in the inner ear which have been demonstrated to have a function in maintaining equilibrium when the body is not moving. They are therefore said to function in static equilibrium.

Otosclerosis. A disease of the ear causing a defect of hearing because free movement of bones of the middle ear is interfered with by sclerotic processes.

Ovum. The egg, or female reproductive cell.

P

Paramecium. A genus of animalcula common in hay infusions, oblong, with many cilia and a mouth near the middle of the ventral surface.

Paranoia. A form of insanity that has its roots in the intellectual life and leads the patient to false interpretations of the actions of others and to the weaving of schemes and speculations that have no foundation in reality.

Parapraxia. A form of disorder of movement in which the patient is unable to put together properly the various elements of a voluntary action though he may be able to perform correctly each part of the complex.

Parataxis. An impulsive drive to react to difficulties in some particular way (*e.g.*, by depression, anxiety) that becomes abnormal by virtue of its intensity or prolongation, or bizarre character and which may be the preliminary stage of a serious breakdown.

Paresis. A syphilitic disease of the nervous system, progressive and incurable, characterized in typical cases by "delusions of grandeur" that make the patient think that he is a notable personality, very wealthy, etc., but capable of simu-

lating any known mental disorder. Paretics usually have a peculiar facial expression and disturbance of speech. They eventually have transitory attacks of paralysis, and later suffer permanent contractures of their limbs and complete dementia.

Parkinson's Facies. The mask-like, stiff, expressionless face of one afflicted with Parkinson's disease (*paralysis agitans*). It is found also in those who have recovered from the acute stages of sleeping sickness (*encephalitis lethargica*).

Pathological. Abnormal; differing from the normal because of an underlying diseased condition.

Pathology. The science that studies the anatomical basis of disease; the underlying condition itself which lies at the basis of any abnormality.

Periosteum. The membrane covering a bone from which the bone was generated and which is capable of generating new bone after a fracture.

Pertussis. Whooping cough.

Phalanges. The bones of the fingers.

Phobia. An unreasonable fear or anxiety, such as the fear of open spaces (*agoraphobia*), the fear of closed spaces (*claustrophobia*), etc.

Photochemical. Pertaining to a chemical reaction brought about by light.

Phrenics. The nerves of respiration that control the diaphragm.

Phylogenetic. Pertaining to the development of the race. Contrasted with ontogenetic, *q.v.*

Physiological Zero. See Zero, physiological.

Pineal Gland. A structure located in the mid-brain above and between the superior colliculi. It is probably a gland of internal secretion and may have an inhibitory effect in childhood on the development of the genital organs, for some cases have been noted of an associaton of premature puberty with a tumor destroying the pineal gland. Fig. 2.

Plethysmograph. An instrument used in studying increase and decrease of blood volume in an organ or part of the body. See p. 120.

Pneumograph. An instrument used for transmitting the movements of breathing to some kind of recording apparatus. See p. 121.

Polyp. Literally an animal with many feet; a name applied to such organisms as the cuttlefish, hydra, and coelenterates. Used also to designate a tumor in the nose or any growths, attached by a stem, on a mucous membrane.

Posterior Longitudinal Fasciculus. See Fasciculus, posterior longitudinal.

Posterior Roots. The fibres passing into the spinal cord in the region of its posterior horns and coming from sensory ganglia located just outside the cord. All forms of body sensation pass through these roots. See Fig. 1, p. 55.

Precordial. Pertaining to the region of the chest in front of the heart.

Præcox. A term frequently used to designate the "shut-in reaction type" of character that shrinks

into itself and will have nothing to do with the outside world after being confronted with some of the difficulties of life. This type of reaction is sometimes the first stage of a dementia. See Dementia præcox.

Probable Error. See Error, probable.

Prognosis. The probable outcome of a disorder.

Pronephros. The first form of secretory apparatus developed in the human embryo.

Prophylaxis. The methods of preventing disease.

Protein. A chemical constituent of the body of complex character containing nitrogen.

Protozoa. Unicellular animals.

Psychasthenia. A term rejected by Freud as referring to a specific condition, but used by Janet to designate the condition of patients whose will is apparently weak and who are, therefore, unable to make a decision, and are also afflicted with abnormal fears and anxieties.

Psychiatrist. One who treats the disorders of the mind.

Psychogenic. Produced by the mind and its mechanisms, but not due to an organic condition or anatomical injury.

Psychoneurosis. A generic name for a number of relatively minor forms of mental disorder, without anatomical basis, which usually do not require commitment of the patient to an institution but more or less incapacitate him for his work. See Hysteria, Neurasthenia, Psychasthenia.

Psychopathic. Manifesting abnormal mental traits but neither feebleminded nor insane.

Psychosis. The technical generic name for insanity.

Psychotaxis. A normal impulsive drive to react to a mental difficulty in a definite way, *e.g.*, to be depressed, to worry, to shrink back, to shirk, etc. See p. 182 ff.

Pulmonary. Pertaining to the lungs.

Pyramidalis Nasi. A facial muscle which throws the skin over the bridge of the nose in heavy folds, indicative of angry aggression.

Pyramidal Tract. A group of nerve fibres proceeding from cells in the motor area of the cortex of the brain to the motor cells in the anterior horn of the spinal cord. It is the main pathway for voluntary motor impulses to the muscles of the body.

Q

Quadriceps Femoris. A group of four muscles in the thigh with a common tendon inserted into the tibia. The quadriceps extends the lower leg, that is, holds it straight.

R

Radicles. Small roots.

Radius. The outer of the two bones of the forearm, that is, the bone on the thumb side.

Rami Communicantes. Small bundles of nerve fibres that connect the spinal cord with the ganglia of the sympathetic nervous system.

Reflex. The mechanical response of a muscle or gland to a definite sensory stimulus. See p. 55 ff.

Reflex Arc. The nervous path of a reflex action from the sensory area of stimulation to the centre and out again to the muscle or gland.

Resection. An operation by which a part of an organ is cut out, *e.g.*, the ends of the bones of a joint.

Resonance, Emotional. The various bodily symptoms of emotional disturbances, *e.g.*, flushing or pallor of the face, hair standing on end, palpitation of the heart, gooseflesh, crying, etc.

Retina. The expansion of the optic nerve over the posterior and interior surface of the eyeball, which takes up visual stimuli and transmits them to the brain.

Retroactive Inhibition. See Inhibition, retroactive.

Rolandic Area. The area around the fissure of Rolando in the brain, that is, the precentral and the postcentral gyrus. Though the precentral gyrus is now known to be exclusively motor in man, and the postcentral, sensory, the term is still used in the old sense and refers to the motor area, that is, the precentral gyrus.

Roots, Anterior. See Anterior roots.

Roots, Posterior. See Posterior roots.

S

Schizophrenia. A synonym for *dementia præcox* (*q. v.*) which expresses the concept of that disorder which regards it as a splitting of the mind, so that emotional expression no longer corresponds to intellectual content.

Sciatic Nerve. A large nerve which proceeds down the back of the thigh, supplying the muscles in the back of the thigh, the leg, and the foot (through its ultimate branches) and returns sensations from a large area of the leg and the foot.

Sclerotic. Hardened.

Semicircular Canals. Three tiny handle-shaped tubes in each inner ear arranged in the three directions of the planes of space. Movements of the body stimulate nerve fibres in the canals, giving rise to a sense of disturbance of equilibrium, or at least to compensatory movements.

Sensory-motor. Pertaining to sensation and movement.

Somatic. Pertaining to, or arising from the body.

Spermatozoön. The male element in the process of fertilization.

Spindles, Muscle. See Neuromuscular end organs.

Splanchnic Nerves. A group of nerve fibres of the sympathetic system that supply the viscera.

Statocysts. Cells in the root caps of plants containing starch grains which function in turning the root downwards. See p. 82.

Strabismus. Crossing of the eyes due to muscular weakness.

Striated. A term used to designate the transverse markings (*striæ*) seen on the contractile fibres of the muscle cells under a high power microscope. Such muscles are in general subject to voluntary control and are distinguished from smooth muscles that lack

these *striæ*. Smooth muscles are found in the internal organs of the body such as the intestines, the blood vessels, the iris, etc.

Strychnine. A drug obtained from the plant Nux vomica, which in poisonous doses so increases the reflex irritability of the spinal cord that any sensory stimulus leads to general convulsion of all the muscles of the body.

Subcortical. Situated below the cortex. See Ganglia, subcortical.

Subcutaneous. Beneath the skin.

Substrate. That which underlies phenomena as that which acts in action; substance in the philosophical sense.

Surface Tension. The pull at the surface of a fluid tending to bring it to a spherical mass, as is actually accomplished to a considerable extent in a drop of falling water. In virtue of surface tension fluids are, as it were, surrounded by an elastic membrane.

Sympathetic Ganglion. See Ganglion, sympathetic.

Synapsis. The junction between two neurons in the nervous system.

Syndrome. A characteristic group of symptoms.

Syringomyelia. A disease of the spinal cord in which tubular cavities are found in its interior.

Systole. The period of the heart beat during which the heart is contracted. Opposed to "diastole" the period of relaxation.

Systolic. Pertaining to systole.

Systolic Blood Pressure. The blood pressure during systole.

T

Tabes Dorsalis. A disease of the nervous system, progressive and incurable, that comes on as the result of a syphilitic infection, whose typical anatomical basis is a degeneration of the posterior sensory columns of the spinal cord, and often of their associated ganglia; and which manifests itself by a peculiar disturbance of gait, loss of the patellar reflexes, a pupil that responds to accommodation but not to light, crises of pain and vomiting, and later perhaps by total blindness, etc.

Teleological. Manifesting design or purpose, or based on the evidences of design.

Temporal Bone. A bone of the skull with various processes within which is located the auditory apparatus.

Thalamus. One of a pair of large ganglionic centres in the brain lying on either side of its third or median ventricle. It is a relay station for touch and pain fibres on the way to the cortex, and among its other functions it is probably a reflex centre for emotional expression.

Thoracic Region. The part of the spinal cord which gives rise to the nerves that supply the trunk of the body.

Threshold. The minimum stimulus that a sense organ can perceive.

Tibia. The internal and heavier of the two bones of the lower leg.

Tibialis Anticus. A muscle in the lower leg that elevates the inner border of the foot.

Tic. A spasmodic jerking of a single muscle or group of muscles.

Tonus. A condition of tension that keeps a muscle more or less moderately stretched and ready for action.

Toxic-Exhaustive. Due to the absorption of poisons or the effects of exhaustion.

Toxin. Strictly, a poison of bacterial origin; sometimes used synonymously with poison in general.

Transversalis Nasi. The muscle of lasciviousness, which produces folds in the skin of the nose as if in sniffing.

Trauma. An injury due to external violence. The term *psychic trauma* is used for a severe emotional shock.

Trigeminal Nerve. The fifth cranial nerve, which supplies the muscles of mastication and transmits sensory stimuli from the skin of the face, the teeth, the mucous membranes of the nose, etc.

Tubercles. The characteristic small nodules produced in the organs of the body by the bacillus of tuberculosis.

Twilight State. A clouding of consciousness, such as occurs for a short period after an epileptic seizure, and is also found in hysterical conditions.

U

Ulna. The inner of the two bones of the forearm, *i.e.*, the one on the side of the little finger.

V

Vagus Nerve. The tenth cranial nerve transmitting sensation from many internal organs, *e.g.*, the lining of all the cavities of the respiratory system; it also supplies the muscles of the larynx and the intestines with motor fibres and slows the heart.

Valvular Disease. Heart disease involving the valves.

Vascular. Pertaining to the blood vessels.

Vein, Femoral. A large vein in the thigh that returns blood from the whole leg, emptying it into the iliac vein, which in turn pours its blood into the inferior vena cava.

Vena Cava. Either of two large veins (superior and inferior) that empty blood directly into the heart.

Vesicle. A small blister or bladder containing fluid.

Vestibular Nerve. That portion of the eighth cranial nerve that receives impressions from the vestibular portion of the inner ear, *i.e.*, the sensory organ of equilibrium.

Viscera. Organs contained in the body cavities.

W

Wallerian Degeneration. Degeneration of the fibres (*a*) of the anterior roots of the spinal cord (if cut) from the point of section outwards; (*b*) of the posterior segments from the point of section inward, when the section is made between the ganglion and the

cord; and from the point of section outwards when the cut is made beyond the ganglion. These facts demonstrate that the cells of the motor fibres are located in the spinal cord and those of the sensory fibres in the ganglion.

Widal Test. A test for typhoid fever, made by allowing a drop of blood serum from a suspected case of typhoid to co-mingle with a drop of a culture of living typhoid bacilli. If the patient has typhoid the bacilli loose their motility and are clumped together in groups.

Z

Zero, Physiological. A temperature which the organism experiences as neither hot nor cold.

Zygomaticus Major. A facial muscle, under good voluntary control, which draws the corners of the lips backward as in a smile.

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